NFLIS-DRUG 2017 MIDYEAR REPORT

NATIONAL FORENSIC LABORATORY INFORMATION SYSTEM

NFLIS

U.S. DEPARTMENT OF JUSTICE
DRUG ENFORCEMENT ADMINISTRATION

DIVERSION CONTROL DIVISION

Contents

Highlights

- From January 1, 2017, through June 30, 2017, an estimated 452,380 distinct drug cases were submitted to State and local laboratories in the United States and analyzed by September 30, 2017. From these cases, an estimated 776,836 drug reports were identified.

- Cannabis/THC was the most frequently reported drug (174,077), followed by methamphetamine (170,300), cocaine (112,756), and heroin (78,833). These four most frequently reported drugs accounted for approximately 69% of all drug reports.

- Nationally, fentanyl reports remained steady from 2001 to 2005, followed by a noticeable increase in 2006 and dramatic increases from 2014 to 2017 ($p < .05$).* Alprazolam reports showed a steady increase from the second half of 2003 through the first half of 2010, increased significantly again from 2014 to the first half of 2016, then decreased through 2017. Oxycodone reports increased from 2001 to 2010, then decreased steadily from 2012 to 2017. Hydrocodone reports increased dramatically from 2001 to the first half of 2010, followed by steady decreases through the first half of 2017. Buprenorphine reports steadily increased from 2006 to 2010 and had a more dramatic increase from 2013 to 2017. Amphetamine reports decreased in 2005, but they steadily increased between 2007 and 2017.

- Fentanyl reports increased significantly from 2014 through 2017 for all four regions. Alprazolam reports in the West and Midwest regions showed an increasing trend, while the Northeast and South regions showed S-shaped trends, with decreased reports in the second half of 2016 and the first half of 2017. For oxycodone reports, all regions had decreases from 2011 through 2017. For hydrocodone reports, all regions showed significant increases from 2001 through 2009, followed by steady decreases through 2017. For buprenorphine reports, the Midwest and South regions showed S-shaped trends, with steady increases through 2017, while the West and Northeast regions had more fluctuation in the number of reports from 2011 through 2017. For amphetamine reports, the Midwest region had a steady increase from the first half of 2005 through 2017, the Northeast and South regions showed a steady increase from the second half of 2007 through 2017, and the West region had a downward S-shaped trend, with larger fluctuations in the number of reports having occurred from 2001 through the first half of 2006.

- Fentanyl, oxycodone, and hydrocodone accounted for 63% of narcotic analgesic reports. Alprazolam accounted for 60% of tranquilizer and depressant reports. Among identified synthetic cannabinoids, FUB-AMB and 5F-ADB accounted for 65% of the reports.

- For cannabis/THC reports, the Northeast region showed an increase from the second half of 2003 to the first half of 2008, followed by a decrease from 2009 through 2017. The West and Midwest regions had more downward curving trend lines from 2001 through 2017, while the South region showed a linear-decreasing trend through 2017. For methamphetamine reports, all regions showed increases beginning around 2010 and 2011 and continuing through the first half of 2017, except the West region had a decrease in reports from the first half of 2016 to the first half of 2017. For cocaine reports, all four regions had decreasing curved trend lines with slight increases in the first half of 2017. For heroin reports, the South region showed an upward-facing U-shaped trend, with the lowest point occurring in 2008, while the other three regions had increasing curved trend lines, with decreases in the number of reports beginning in the second half of 2015 for the West and Midwest regions and in the first half of 2016 for the Northeast region. For MDMA reports, the trend lines for all four regions showed a decrease from 2001 through 2004 and an increase from 2004 to the first half of 2010, followed by a steady decrease through the second half of 2012 and a flat line of a consistent number of reports from 2013 through 2017.

- Cannabis/THC was the most frequently reported drug in the Midwest (25%) and Northeast (27%) regions, and methamphetamine was the most frequently reported drug in the West (46%) and South (23%) regions.

- Nationwide, cannabis/THC reports decreased from 2001 to 2004, slightly increased through the first half of 2010, then decreased through 2017. Methamphetamine reports increased from 2001 through the first half of 2005, decreased through 2010, then increased from 2011 to 2017. Cocaine reports gradually increased from 2001 to 2007, significantly decreased through 2014, then slightly increased through 2017. Heroin reports decreased from 2001 to 2006, increased through 2015, then decreased in 2016 and 2017. MDMA reports increased from 2003 through 2007, sharply decreased from 2010 to 2013, then gradually increased through 2017.

*Curved trends are sometimes described as U-shaped (i.e., decreasing in earlier years and increasing in recent years) and S-shaped (i.e., two turns in the trend, roughly increasing-decreasing-increasing or decreasing-increasing-decreasing). See Appendix A for a more detailed methodology discussion.

Introduction

The National Forensic Laboratory Information System (NFLIS) is a program of the Drug Enforcement Administration (DEA), Diversion Control Division. NFLIS-Drug systematically collects drug identification results and associated information from drug cases submitted to and analyzed by Federal, State, and local forensic laboratories. These laboratories analyze controlled and noncontrolled substances secured in law enforcement operations across the country, making NFLIS-Drug an important resource in monitoring illicit drug use and trafficking, including the diversion of legally manufactured drugs into illegal markets. NFLIS-Drug includes information on the specific substance and the characteristics of drug evidence, such as purity, quantity, and drug combinations. These data are used to support drug scheduling efforts and to inform drug policy and drug enforcement initiatives nationally and in local communities around the country.
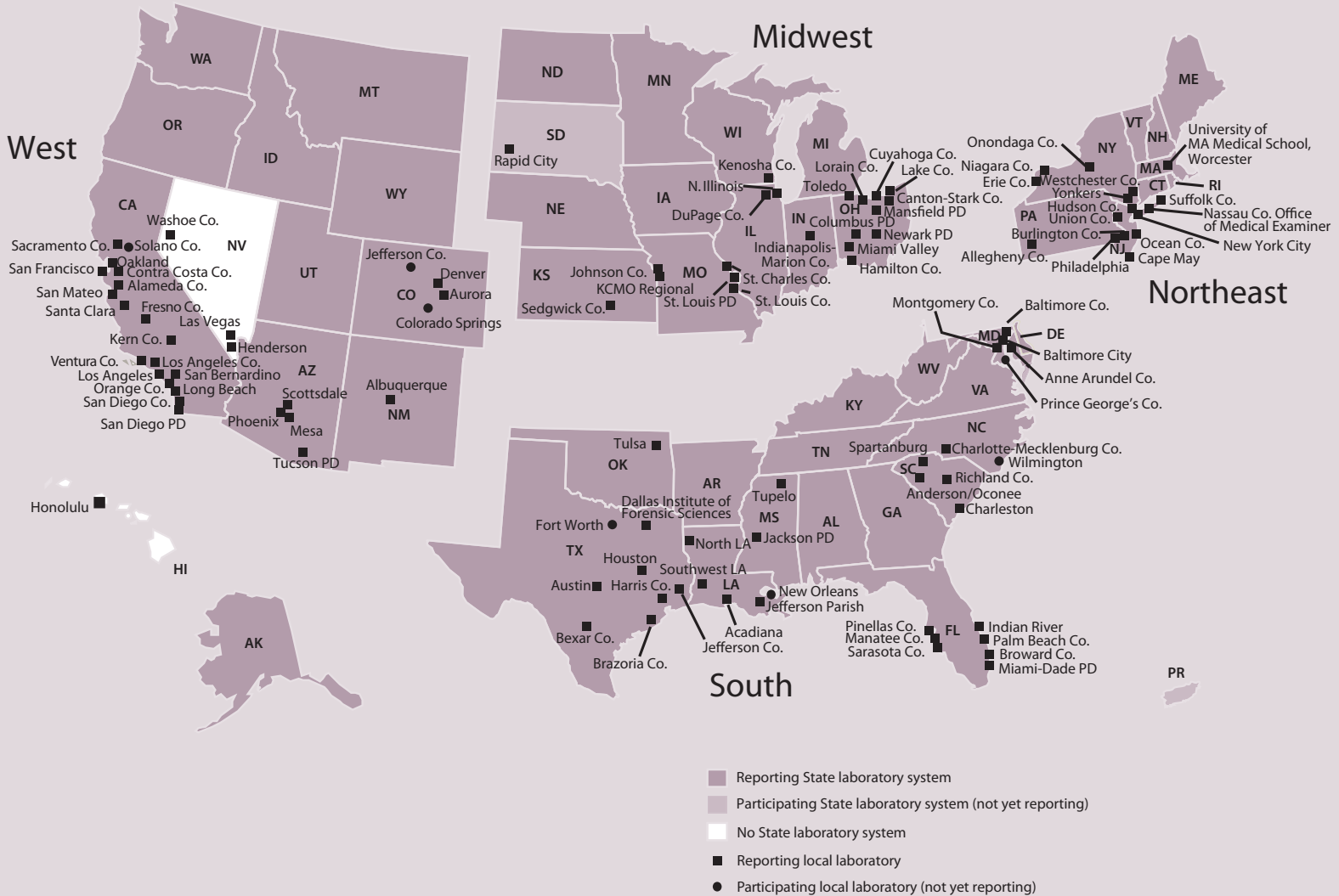
NFLIS-Drug is a comprehensive information system that includes data from forensic laboratories that handle the Nation's drug analysis cases. The NFLIS-Drug participation rate, defined as the percentage of the national drug caseload represented by laboratories that have joined the system, is more than 98%. Currently, NFLIS-Drug includes 50 State systems and 102 local or municipal laboratories/laboratory systems, representing a total of 280 individual laboratories. The NFLIS-Drug database also includes Federal data from DEA and U.S. Customs and Border Protection (CBP) laboratories.

This publication presents the results of drug cases *submitted* to State and local laboratories from January 1, 2017, through June 30, 2017, which were *analyzed* by September 30, 2017. Data from Federal laboratories are also included in this publication. The data presented in this publication include *all* drugs mentioned in the laboratories' reported drug items.

Section 1 of this publication provides national and regional estimates for the 25 most frequently identified drugs, as well as national and regional trends from January 2001 through June 2017. Section 2 presents estimates of specific drugs by drug category. All estimates are based on the NEAR approach (National Estimates Based on All Reports).

Appendix A provides details on the methodology used in preparing the data presented in this publication. Appendix B includes a list of NFLIS-Drug participating and reporting laboratories. The benefits and limitations of NFLIS-Drug are presented in Appendix C.

Participating Laboratories, by U.S. Census Region

West

Midwest

Northeast

South

WA, OR, CA, NV, ID, MT, WY, UT, AZ, NM, CO, HI, AK

ND, SD, MN, WI, MI, IA, NE, KS, MO, IN, OH, IL

ME, VT, NH, NY, MA, CT, RI, PA, NJ

OK, TX, AR, LA, MS, AL, TN, KY, GA, SC, NC, VA, WV, MD, DE, FL, PR

West region labels:
- Washoe Co.
- Sacramento Co.
- Solano Co.
- Oakland
- San Francisco
- Contra Costa Co.
- Alameda Co.
- San Mateo
- Santa Clara
- Fresno Co.
- Las Vegas
- Kern Co.
- Henderson
- Ventura Co.
- Los Angeles Co.
- Los Angeles
- San Bernardino
- Orange Co.
- Long Beach
- San Diego Co.
- San Diego PD
- Phoenix
- Scottsdale
- Mesa
- Tucson PD
- Albuquerque
- Jefferson Co.
- Denver
- Aurora
- Colorado Springs
- Honolulu

Midwest region labels:
- Rapid City
- Kenosha Co.
- N. Illinois
- DuPage Co.
- Johnson Co.
- KCMO Regional
- Sedgwick Co.
- St. Louis PD
- St. Charles Co.
- St. Louis Co.
- Indianapolis-Marion Co.
- Columbus PD
- Toledo
- Lorain Co.
- Cuyahoga Co.
- Lake Co.
- Canton-Stark Co.
- Mansfield PD
- Newark PD
- Miami Valley
- Hamilton Co.

South region labels:
- Tulsa
- Dallas Institute of Forensic Sciences
- Fort Worth
- Houston
- Southwest LA
- Austin
- Harris Co.
- North LA
- Bexar Co.
- Acadiana
- Jefferson Co.
- Brazoria Co.
- New Orleans
- Jefferson Parish
- Tupelo
- Jackson PD
- Spartanburg
- Charlotte-Mecklenburg Co.
- Wilmington
- Richland Co.
- Anderson/Oconee
- Charleston
- Montgomery Co.
- Baltimore Co.
- Baltimore City
- Anne Arundel Co.
- Prince George's Co.
- Pinellas Co.
- Manatee Co.
- Sarasota Co.
- Indian River
- Palm Beach Co.
- Broward Co.
- Miami-Dade PD

Northeast region labels:
- Onondaga Co.
- Niagara Co.
- Erie Co.
- Westchester Co.
- Yonkers
- Hudson Co.
- Union Co.
- Burlington Co.
- Allegheny Co.
- Philadelphia
- NJ
- Ocean Co.
- Cape May
- New York City
- University of MA Medical School, Worcester
- Suffolk Co.
- Nassau Co. Office of Medical Examiner

Legend:
- Reporting State laboratory system
- Participating State laboratory system (not yet reporting)
- No State laboratory system
- ■ Reporting local laboratory
- ● Participating local laboratory (not yet reporting)

Section 1: National and Regional Estimates

This section presents national and regional estimates of drugs *submitted* to State and local laboratories from January 1, 2017, through June 30, 2017, that were *analyzed* by September 30, 2017 (see Table 1.1). National and regional drug estimates include *all* drug reports mentioned in laboratories' reported drug items. National drug case estimates are also presented (see Table 1.2). In addition, semiannual trends are presented for selected drugs from January 2001 through June 2017.

The NEAR approach (National Estimates Based on All Reports) was used to produce estimates for the Nation and for the U.S. census regions. The NEAR approach uses all NFLIS-Drug reporting laboratories. Appendix A provides a detailed description of the methods used in preparing these estimates.

Table 1.1	NATIONAL AND REGIONAL ESTIMATES FOR THE 25 MOST FREQUENTLY IDENTIFIED DRUGS[1] Estimated number and percentage of total drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, and analyzed by September 30, 2017

Drug	National Number	National Percent	West Number	West Percent	Midwest Number	Midwest Percent	Northeast Number	Northeast Percent	South Number	South Percent
Cannabis/THC	174,077	22.41%	17,001	14.84%	47,954	25.18%	35,544	27.41%	73,578	21.51%
Methamphetamine	170,300	21.92%	52,894	46.16%	34,676	18.21%	3,290	2.54%	79,439	23.22%
Cocaine	112,756	14.51%	8,392	7.32%	26,416	13.87%	27,159	20.94%	50,789	14.85%
Heroin	78,833	10.15%	14,518	12.67%	21,040	11.05%	22,471	17.33%	20,804	6.08%
Fentanyl	25,460	3.28%	373	0.33%	7,995	4.20%	11,577	8.93%	5,516	1.61%
Alprazolam	23,877	3.07%	2,635	2.30%	5,199	2.73%	2,911	2.24%	13,131	3.84%
Oxycodone	16,405	2.11%	1,391	1.21%	3,848	2.02%	3,173	2.45%	7,992	2.34%
Hydrocodone	10,802	1.39%	1,228	1.07%	2,781	1.46%	352	0.27%	6,441	1.88%
Buprenorphine	9,180	1.18%	732	0.64%	1,858	0.98%	2,180	1.68%	4,411	1.29%
Amphetamine	6,158	0.79%	445	0.39%	1,689	0.89%	861	0.66%	3,163	0.92%
Clonazepam	5,477	0.71%	454	0.40%	1,264	0.66%	1,031	0.80%	2,728	0.80%
FUB-AMB	3,995	0.51%	253	0.22%	921	0.48%	617	0.48%	2,204	0.64%
5F-ADB	3,442	0.44%	29	0.03%	337	0.18%	117	0.09%	2,959	0.86%
Furanyl fentanyl	3,322	0.43%	46	0.04%	1,086	0.57%	1,003	0.77%	1,187	0.35%
Tramadol	3,055	0.39%	217	0.19%	947	0.50%	349	0.27%	1,541	0.45%
MDMA	2,695	0.35%	616	0.54%	876	0.46%	273	0.21%	929	0.27%
Morphine	2,524	0.32%	329	0.29%	620	0.33%	272	0.21%	1,303	0.38%
N-Ethylpentylone	2,520	0.32%	24	0.02%	410	0.22%	227	0.18%	1,858	0.54%
Phencyclidine (PCP)	2,404	0.31%	160	0.14%	521	0.27%	678	0.52%	1,045	0.31%
Carfentanil	2,268	0.29%	4	0.00%	1,763	0.93%	108	0.08%	393	0.11%
Diazepam	2,119	0.27%	244	0.21%	535	0.28%	205	0.16%	1,135	0.33%
Naloxone	2,031	0.26%	66	0.06%	273	0.14%	851	0.66%	840	0.25%
Lysergic acid diethylamide (LSD)	2,001	0.26%	324	0.28%	774	0.41%	180	0.14%	723	0.21%
Psilocin/psilocibin	1,929	0.25%	530	0.46%	594	0.31%	197	0.15%	609	0.18%
Codeine	1,596	0.21%	207	0.18%	329	0.17%	222	0.17%	839	0.25%
Top 25 Total	669,225	86.15%	103,113	89.98%	164,706	86.48%	115,850	89.32%	285,558	83.47%
All Other Drug Reports	107,610	13.85%	11,480	10.02%	25,739	13.52%	13,846	10.68%	56,545	16.53%
Total Drug Reports[2]	776,836	100.00%	114,593	100.00%	190,445	100.00%	129,696	100.00%	342,103	100.00%

FUB–AMB=Methyl 2-({1-[(4-fluorophenyl)methyl]-1H-indazole-3-carbonyl}amino)-3-methylbutanoate

5F–ADB=Methyl (R)-2-(1-(5-fluoropentyl)-1H-indazole-3-carboxamido)-3,3-dimethylbutanoate

MDMA=3,4-Methylenedioxymethamphetamine

[1] Sample n's and 95% confidence intervals for all estimates are available on request.
[2] Numbers and percentages may not sum to totals because of rounding.

Table 1.2	NATIONAL CASE ESTIMATES
	Top 25 estimated number of drug-specific cases and their percentage of distinct cases, January 1, 2017, through June 30, 2017

Drug	Number	Percent
Methamphetamine	132,211	29.23%
Cannabis/THC	123,332	27.26%
Cocaine	89,319	19.74%
Heroin	60,723	13.42%
Alprazolam	20,151	4.45%
Fentanyl	19,865	4.39%
Oxycodone	12,768	2.82%
Hydrocodone	9,356	2.07%
Buprenorphine	8,207	1.81%
Amphetamine	5,198	1.15%
Clonazepam	4,854	1.07%
FUB-AMB	3,191	0.71%
5F-ADB	2,924	0.65%
Furanyl fentanyl	2,740	0.61%
Tramadol	2,684	0.59%
Morphine	2,226	0.49%
Phencyclidine (PCP)	2,124	0.47%
MDMA	2,032	0.45%
Carfentanil	1,929	0.43%
Diazepam	1,902	0.42%
Naloxone	1,885	0.42%
N-Ethylpentylone	1,728	0.38%
Psilocin/psilocibin	1,718	0.38%
Lysergic acid diethylamide (LSD)	1,703	0.38%
Codeine	1,407	0.31%
Top 25 Total	516,177	114.10%
All Other Drugs	83,250	18.40%
Total All Drugs[1]	599,427	132.51%[2]

FUB-AMB=Methyl 2-({1-[(4-fluorophenyl)methyl]-1H-indazole-3-carbonyl}amino)-3-methylbutanoate

5F-ADB=Methyl (R)-2-(1-(5-fluoropentyl)-1H-indazole-3-carboxamido)-3,3-dimethylbutanoate

MDMA=3,4-Methylenedioxymethamphetamine

[1] Numbers and percentages may not sum to totals because of rounding.

[2] Multiple drugs can be reported within a single case, so the cumulative percentage exceeds 100%. The estimated national total of distinct case percentages is based on 452,380 distinct cases submitted to State and local laboratories from January 1, 2017, through June 30, 2017, and analyzed by September 30, 2017.

Drugs Reported by Federal Laboratories

The majority of drug reports presented in this section are from the eight U.S. Drug Enforcement Administration (DEA) laboratories. The data reflect results of substance evidence from drug seizures, undercover drug buys, and other evidence analyzed at DEA laboratories located across the country. DEA data include results for drug cases submitted by DEA agents and task force officers, other Federal law enforcement agencies, and select local police agencies. Although DEA data capture domestic and international drug cases, the results presented in this section describe only those drugs obtained within the United States. In addition to drug reports from the DEA, reports from seven U.S. Customs and Border Protection laboratories are also included.

MOST FREQUENTLY REPORTED DRUGS BY FEDERAL LABORATORIES[1]
Number and percentage of drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, and analyzed by September 30, 2017

Drug	Number	Percent
Methamphetamine	4,608	18.55%
Cocaine	3,546	14.28%
Heroin	2,548	10.26%
Cannabis/THC	1,413	5.69%
Fentanyl	1,026	4.13%
FUB-AMB	424	1.71%
Oxycodone	328	1.32%
Testosterone	235	0.95%
Furanyl fentanyl	227	0.91%
Alprazolam	220	0.89%
All Other Drug Reports	10,264	41.32%
Total Drug Reports	24,839	100.00%[2]

FUB-AMB=Methyl 2-({1-[(4-fluorophenyl)methyl]-1H-indazole-3-carbonyl}amino)-3-methylbutanoate

[1] Federal drug reports in this table include 22,941 reports from Drug Enforcement Administration laboratories and 1,898 reports from U.S. Customs and Border Protection laboratories.

[2] Numbers and percentages may not sum to totals because of rounding.

National and Regional Drug Trends

The remainder of this section presents semiannual national and regional trends of selected drugs submitted to State and local laboratories during each six-month data reference period and analyzed within three months of the end of each six-month period. The trend analyses test the data for the presence of linear and curved trends using statistical methods described in more detail in Appendix A, including the improvement to the covariance estimation in the long-term analysis introduced in 2016. Curved trends are sometimes described as U-shaped (i.e., decreasing in earlier years and increasing in recent years) and S-shaped (i.e., two turns in the trend, roughly increasing-decreasing-increasing or decreasing-increasing-decreasing). Because the trends are determined through regression modeling, the descriptions of the trends detailed in this section may differ slightly from the plotted lines of estimates featured in Figures 1.1 through 1.15. Estimates include all drug reports identified among the NFLIS-Drug laboratories' reported drug items. Between the first half of 2001 and the first half of 2017, the total estimated number of drug reports decreased approximately 13%, from 887,939 to 776,836.

National prescription drug trends

Figures 1.1 and 1.2 present national trends for the estimated number of prescription drug reports that were identified as fentanyl, alprazolam, oxycodone, hydrocodone, buprenorphine, and amphetamine. Note that laboratories do not identify whether reports are for prescription drugs that are licitly or illicitly manufactured. Significant ($p < .05$) results include the following:

- Fentanyl reports remained steady from 2001 to 2005, followed by a noticeable increase in the second half of 2006. Fentanyl reports continued to remain steady until dramatic increases occurred from 2014 through the first half of 2017.

- Alprazolam reports showed a steady increase from the second half of 2003 to the first half of 2010, followed by a decrease through 2013. Alprazolam reports significantly increased from 2014 to the first half of 2016, with a reduced number of reports in the second half of 2016 and the first half of 2017.

- Oxycodone reports had dramatic increases from 2001 to 2010, followed by steady decreases through the first half of 2017.

- Hydrocodone reports had dramatic increases from 2001 to the first half of 2010, followed by steady decreases through the first half of 2017.

- Buprenorphine and amphetamine reports showed S-shaped trends. Buprenorphine reports had a steady increase from the first half of 2006 through the first half of 2010, then a more dramatic increase from 2013 to the first half of 2017. Amphetamine reports were steady from 2001 through 2004, followed by a decrease in 2005; amphetamine reports then steadily increased from 2007 through the first half of 2017.

Significance tests were also performed on differences from the first half of 2016 to the first half of 2017 to identify more recent changes. Across these two periods, reports of fentanyl (from 14,769 to 25,460 reports) and buprenorphine (from 8,767 to 9,180 reports) increased significantly ($p < .05$). Reports of alprazolam (from 25,792 to 23,877 reports), oxycodone (from 19,493 to 16,405 reports), and hydrocodone (from 12,800 to 10,802 reports) decreased significantly. The decrease in reports of amphetamine (from 6,379 to 6,158 reports) was not statistically significant.

OxyContin®

Figure 1.1 National trend estimates for fentanyl, alprazolam, and oxycodone, January 2001–June 2017
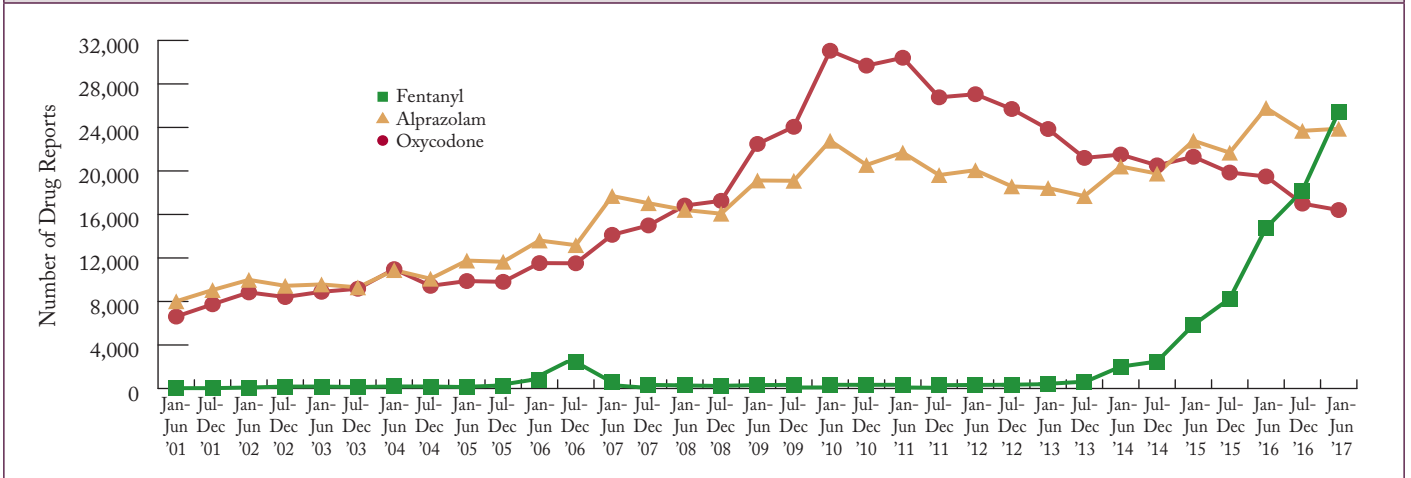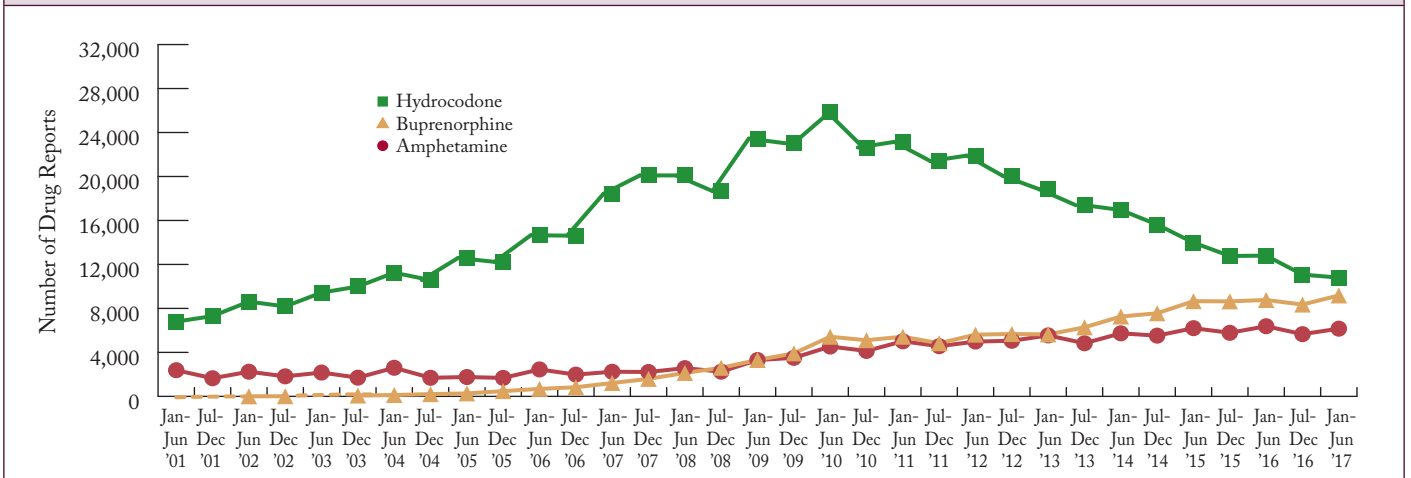

Figure 1.2 National trend estimates for hydrocodone, buprenorphine, and amphetamine, January 2001–June 2017[1]

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

Other national drug trends

Figures 1.3 and 1.4 present national trends for reports of cannabis/THC, methamphetamine, cocaine, heroin, and MDMA. Significant ($p < .05$) results include the following:

- Cannabis/THC reports decreased from 2001 to 2004, slightly increased from 2005 to the first half of 2010, then decreased through the first half of 2017.

- Methamphetamine reports increased from 2001 through the first half of 2005, decreased from 2005 to 2010, then increased from 2011 through the first half of 2017.

- Cocaine reports gradually increased from 2001 to 2007, then significantly decreased through 2014, followed by a slight increase through the first half of 2017.

- Heroin reports decreased from 2001 through 2006, then increased through 2015 until recent decreases in reports occurred through the first half of 2017.

- MDMA reports decreased from 2001 to 2003, then increased through the first half of 2007. A sharp decrease in MDMA reports occurred from 2010 to 2013, followed by a gradual increase through the first half of 2017.

More recently, from the first half of 2016 to the first half of 2017, reports of methamphetamine (from 155,535 to 170,300 reports) and cocaine (from 108,210 to 112,756 reports) increased significantly ($p < .05$). Reports of cannabis/THC (from 202,647 to 174,077 reports), heroin (from 86,918 to 78,833 reports), and MDMA (from 2,901 to 2,695 reports) decreased significantly.

Figure 1.3 National trend estimates for cannabis/THC and methamphetamine, January 2001–June 2017
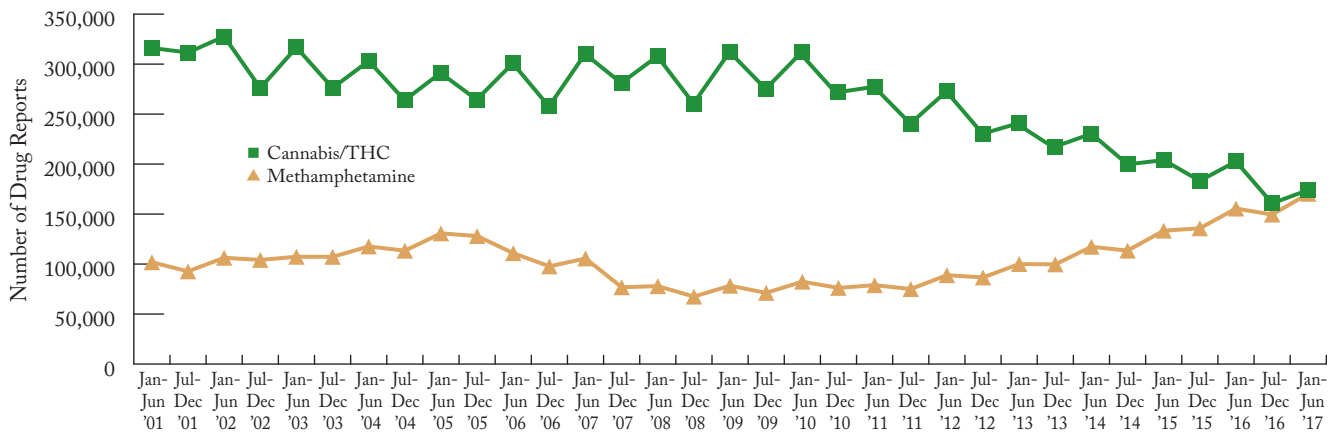
Figure 1.4 National trend estimates for cocaine, heroin, and MDMA, January 2001–June 2017
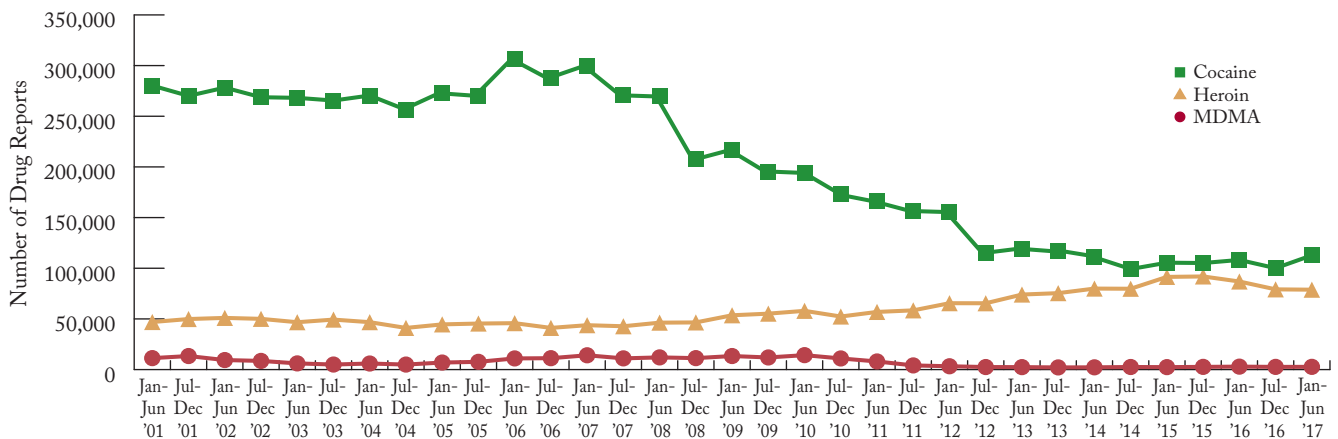
Regional prescription drug trends

Figures 1.5 through 1.10 show regional trends per 100,000 persons aged 15 or older for reports of fentanyl, alprazolam, oxycodone, hydrocodone, buprenorphine, and amphetamine from the first half of 2001 to the first half of 2017. These figures illustrate changes in prescription drugs reported over time, taking into account the population aged 15 years or older in each U.S. census region. Significant ($p < .05$) trend results include the following:

- For fentanyl reports, the West region showed a more gradual increase from 2001 to 2014 than the other regions, followed by significant increases in reports through the first half of 2017. Reports remained fairly steady from 2001 through 2013 for the Midwest, Northeast, and South regions until significant increases began in 2014 and continued through the first half of 2017. The Midwest and Northeast regions had noticeable increases in 2006 as reflected in the national trend.

- For alprazolam reports, the West showed an increasing curved trend through the first half of 2017. Similarly, the Midwest region had increases in reports that continued through the first half of 2017. The Northeast and South regions had increases from 2003 to 2010, followed by slight decreases through 2013, then continued increases through the first half of 2016. The number of reports for these two regions decreased in the second half of 2016 and the first half of 2017.

- For oxycodone reports, all regions except the Midwest region showed trends similar to the national trend. The Midwest region trend had a slower rate of decrease from 2011 through the first half of 2017, while the other regions had steeper declines in the number of reports from 2011 through the first half of 2017.

- For hydrocodone reports, all regions showed significant increases from 2001 through at least 2009, followed by steady decreases through the first half of 2017. Similar to the regional trends for oxycodone, the Midwest region decreased at a slower rate than other regions.

- For buprenorphine reports, the Midwest and South regions showed S-shaped trends, with steady increases in reports through the first half of 2017. The West and Northeast regions had more fluctuation in the number of reports from 2011 through the first half of 2017.

- For amphetamine reports, the Midwest region had an S-shaped trend, with a fairly steady increase in reports from the first half of 2005 through the first half of 2017. The Northeast and South regions showed a steady increase in reports from the second half of 2007 through the first half of 2017. The West region had a downward S-shaped trend, with larger fluctuations in the number of reports having occurred from 2001 through the first half of 2006. Unlike the other regions, the number of reports in the West region remained steady, with slight decreases in recent periods.

More recently, from the first half of 2016 to the first half of 2017, fentanyl reports increased significantly in all regions, while oxycodone and hydrocodone reports decreased significantly in all regions ($p < .05$). Alprazolam reports decreased significantly in the Northeast and South regions, and amphetamine reports decreased significantly in the Midwest and West regions. Buprenorphine reports increased significantly in the West region.

Fentanyl pills and crystals

Figure 1.5 Regional trends in fentanyl reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]
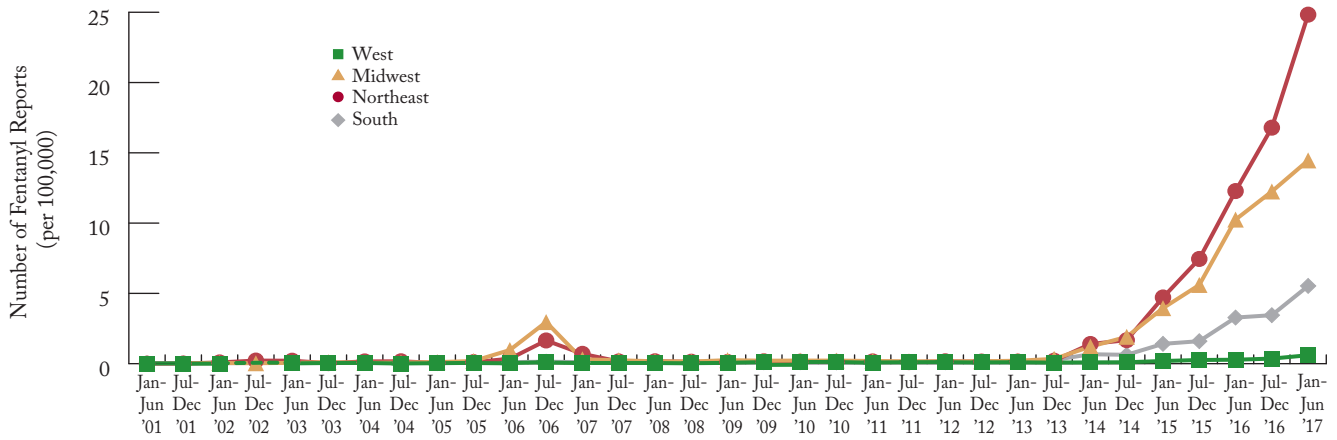

Figure 1.6 Regional trends in alprazolam reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]
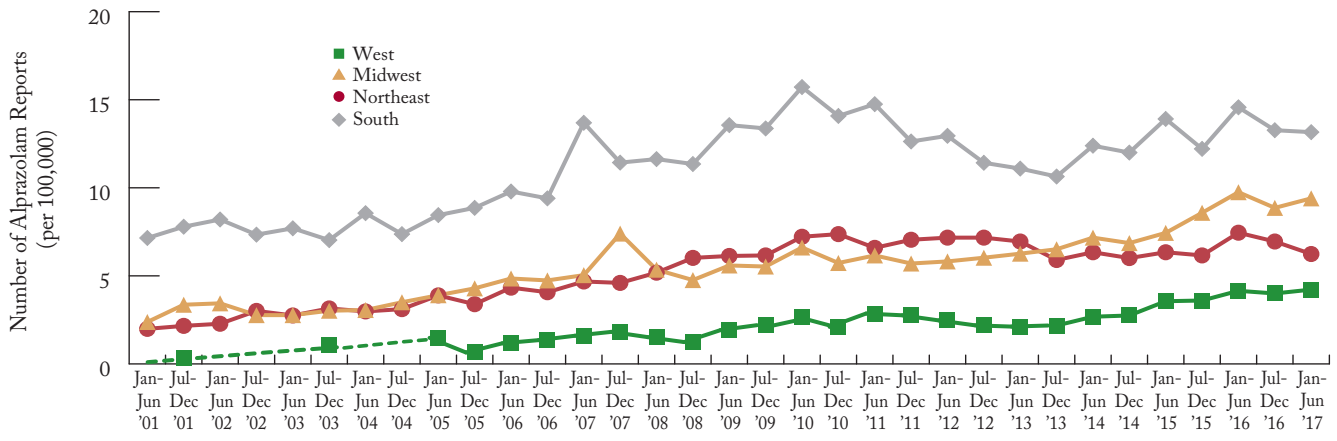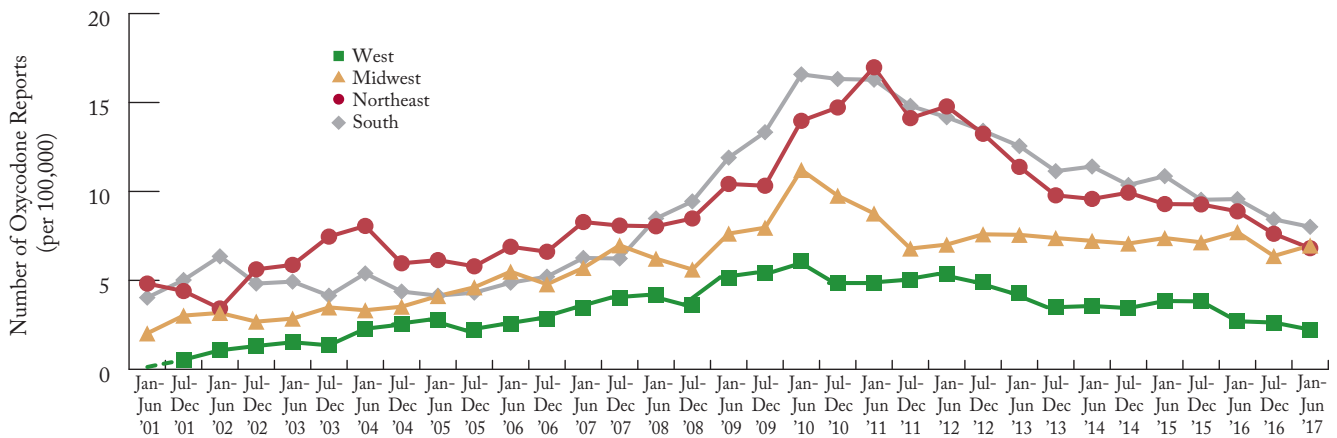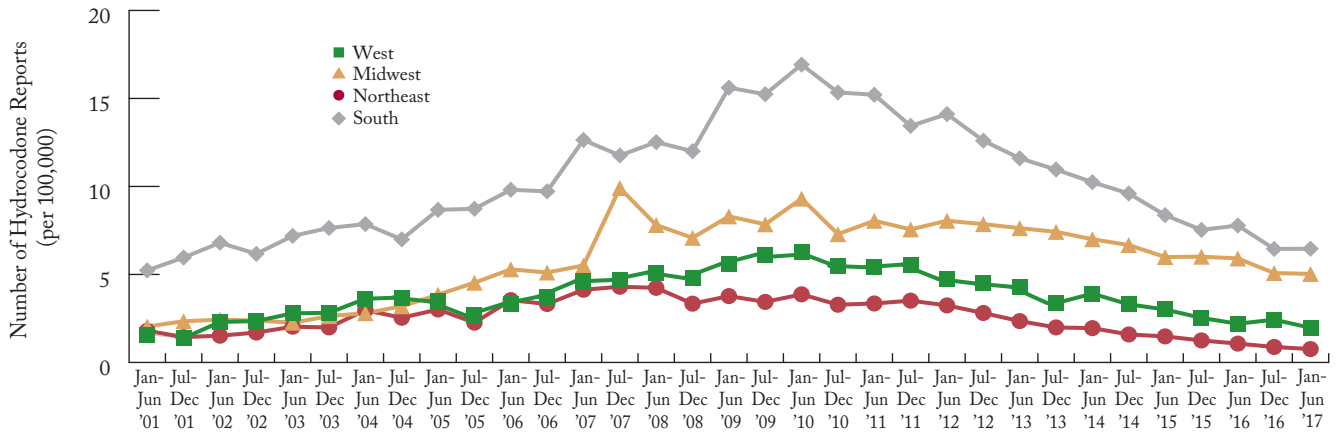

Figure 1.7 Regional trends in oxycodone reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]

Note: U.S. Census 2017 population data by age were not available for this publication. Population data for 2017 were imputed.

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

Figure 1.8 Regional trends in hydrocodone reported per 100,000 persons aged 15 or older, January 2001–June 2017

Figure 1.9 Regional trends in buprenorphine reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]
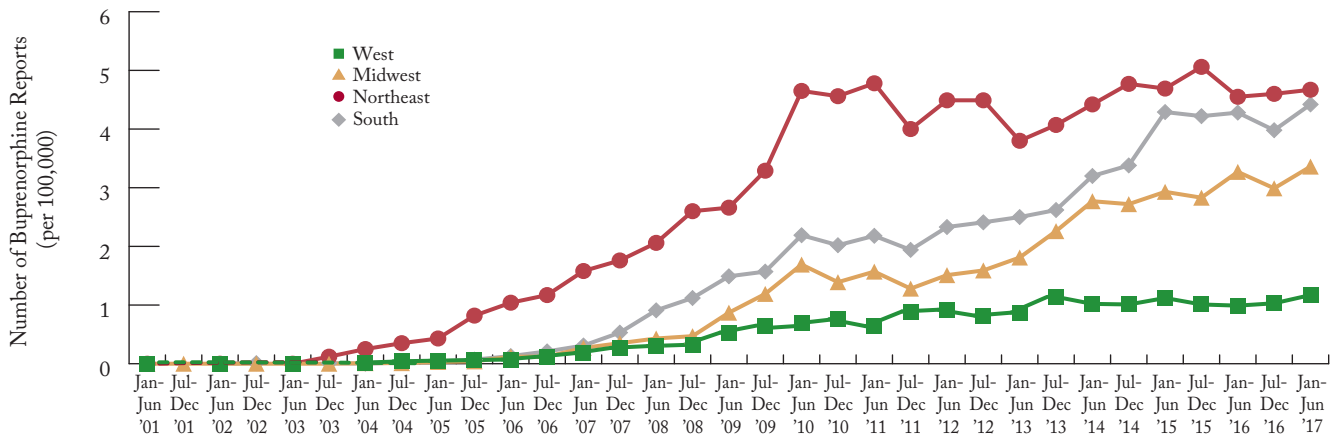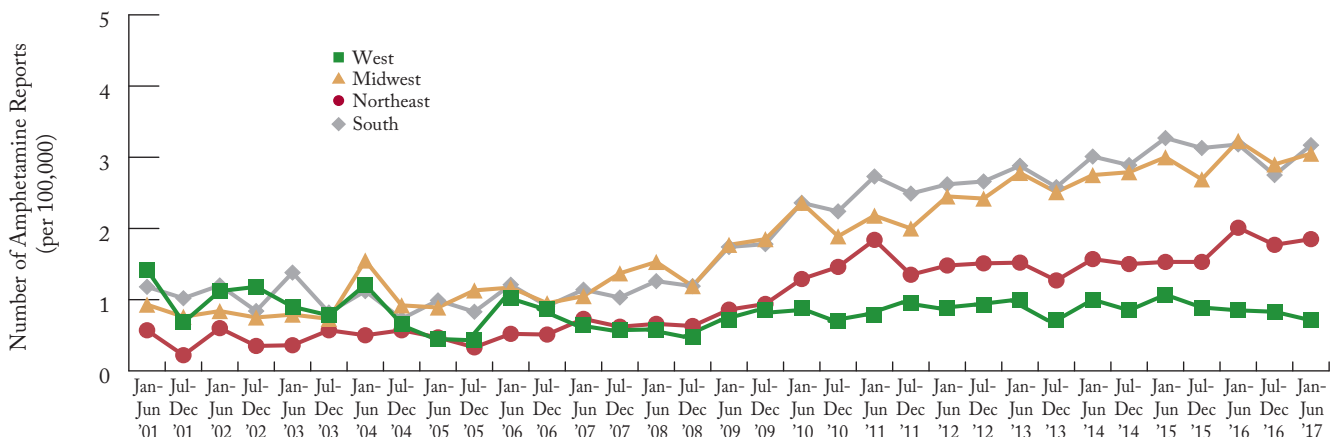

Figure 1.10 Regional trends in amphetamine reported per 100,000 persons aged 15 or older, January 2001–June 2017

Note: U.S. Census 2017 population data by age were not available for this publication. Population data for 2017 were imputed.

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

Other regional drug trends

Figures 1.11 through 1.15 present regional trends per 100,000 persons aged 15 or older for cannabis/THC, methamphetamine, cocaine, heroin, and MDMA reports from the first half of 2001 through the first half of 2017. Significant ($p < .05$) trends include the following:

- For cannabis/THC reports, the Northeast region had the most noticeable periods of increase (the second half of 2003 to the first half of 2008) and decrease (2009 through the first half of 2017). The West and Midwest regions had more downward curving trend lines from 2001 through the first half of 2017, while the South region showed a linear-decreasing trend through the first half of 2017.

- For methamphetamine reports, the trends for the Northeast and South regions were S-shaped. The West and Midwest regions had more pronounced decreases than the other two regions from around 2005 through the first half of 2010. All regions showed increases beginning around 2010 and 2011 and continuing through the first half of 2017, except that the West region had a decrease in reports from the first half of 2016 to the first half of 2017.

- For cocaine reports, all four regions had decreasing curved trend lines, with slight increases in reports in the first half of 2017. The Midwest and Northeast regions had steady decreases in reports from the first half of 2008 through 2012. The West and South regions had steadier declines through 2016.

- For heroin reports, the South region showed an upward-facing U-shaped trend, with the lowest point occurring in 2008. The other three regions had increasing curved trend lines, with decreases in the number of reports beginning in the second half of 2015 for the West and Midwest regions and in the first half of 2016 for the Northeast region.

- For MDMA reports, the trend lines for all four regions showed a decrease from 2001 through 2004, followed by an increase through the first half of 2010, although the West and Midwest regions had much steeper increases during this time. Regional MDMA trend lines decreased steadily through the second half of 2012, followed by a flat line of a consistent number of reports through the first half of 2017.

Between 2016 and 2017, cannabis/THC reports decreased significantly in all regions except the South, and heroin reports decreased significantly in the Northeast and Midwest regions ($p < .05$). Methamphetamine reports increased significantly in the Midwest, Northeast, and South regions, but they decreased significantly in the West region. Cocaine reports increased significantly in the Midwest and South regions. MDMA reports increased significantly in the South region, but they decreased significantly in the West region.

Figure 1.11 Regional trends in cannabis/THC reported per 100,000 persons aged 15 or older, January 2001–June 2017
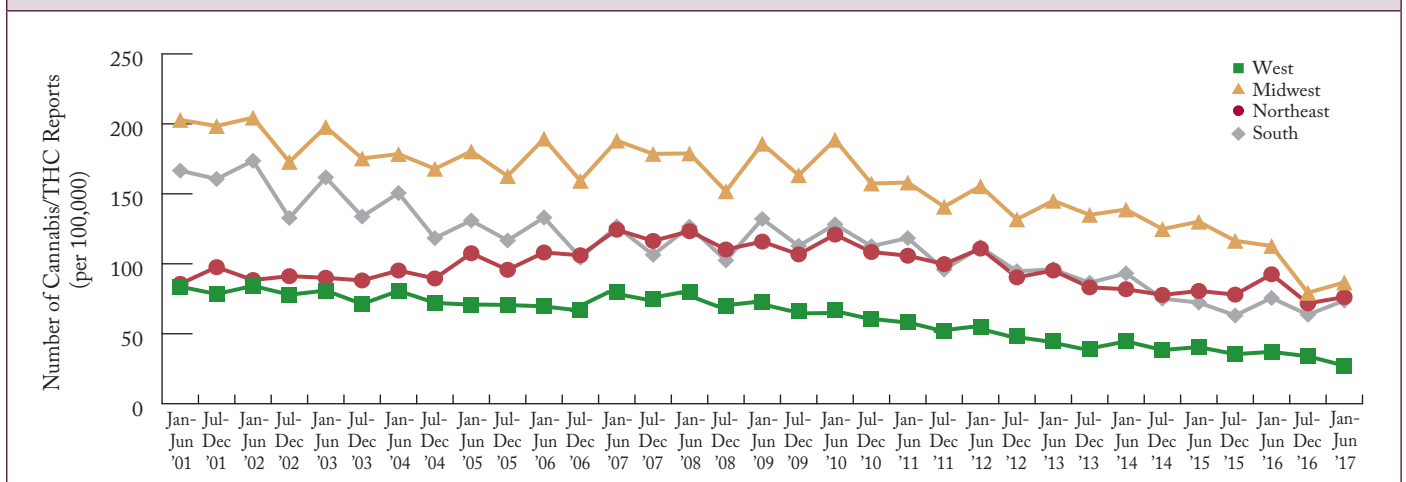
Note: U.S. Census 2017 population data by age were not available for this publication. Population data for 2017 were imputed.

Figure 1.12 Regional trends in methamphetamine reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]
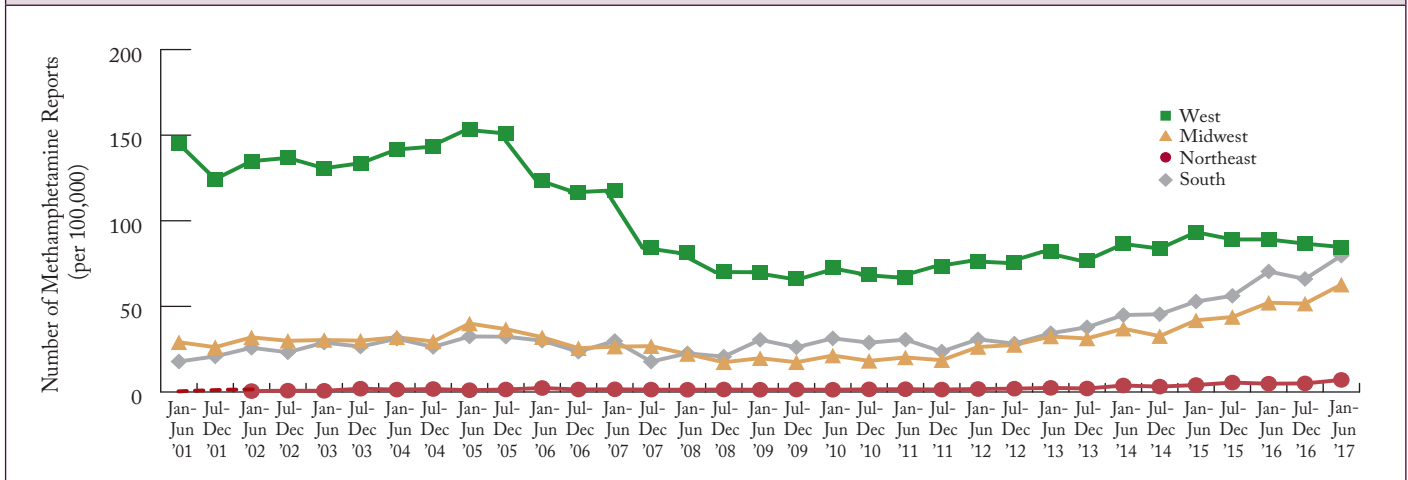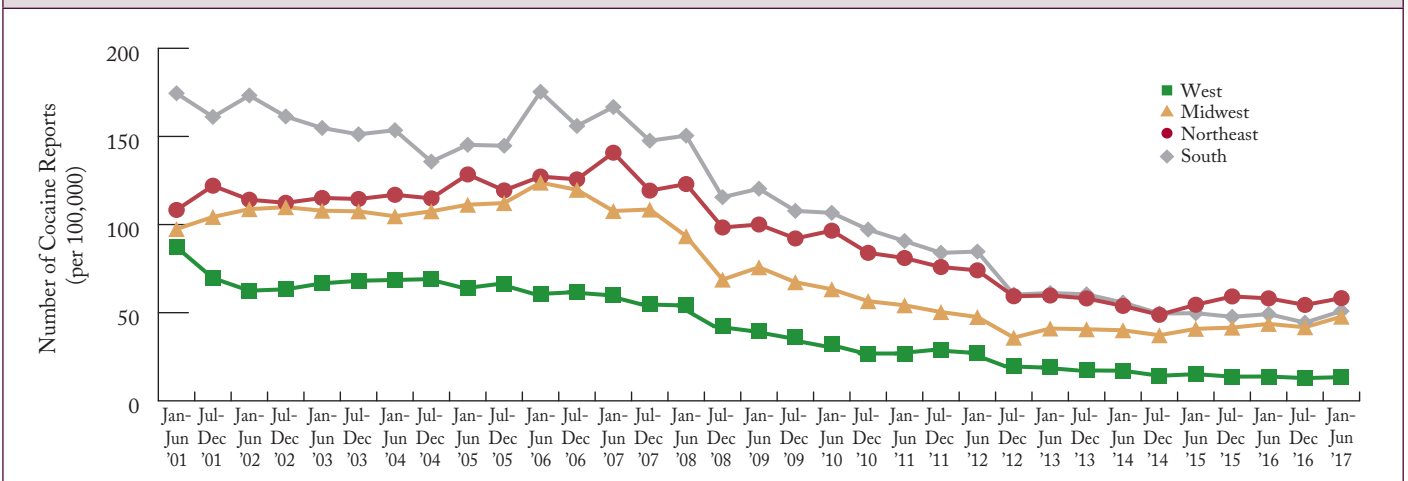

Figure 1.13 Regional trends in cocaine reported per 100,000 persons aged 15 or older, January 2001–June 2017

Note: U.S. Census 2017 population data by age were not available for this publication. Population data for 2017 were imputed.
[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

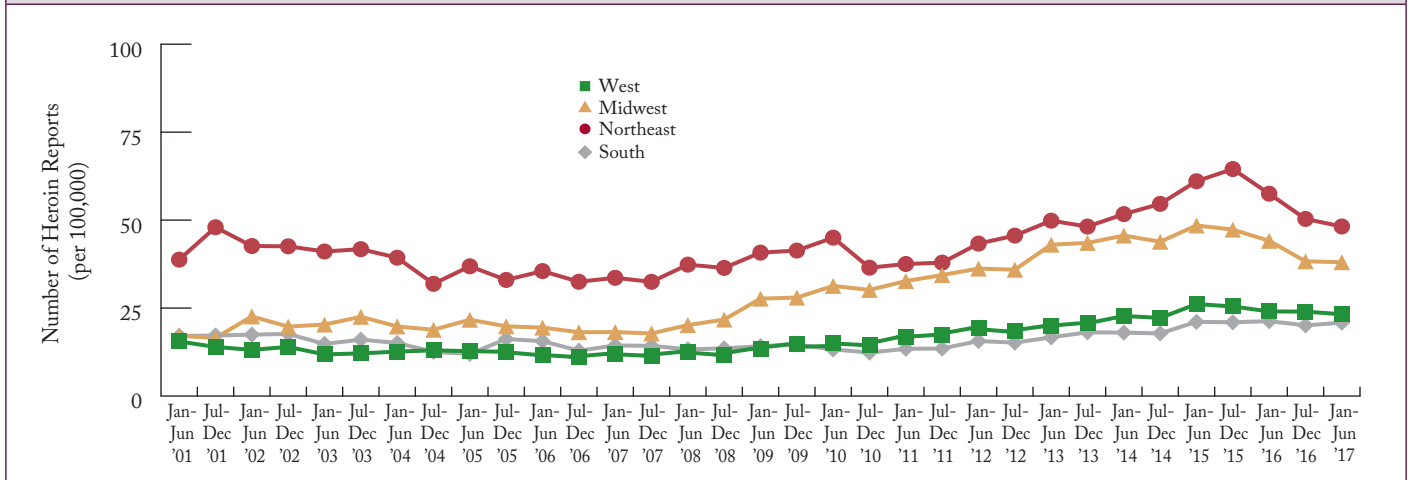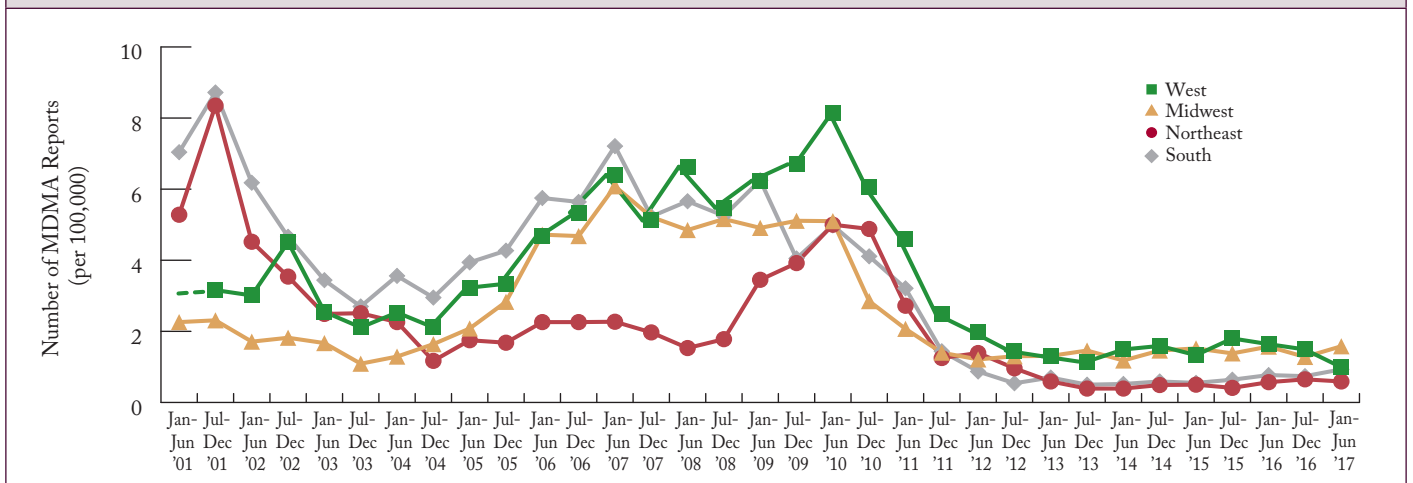**Figure 1.14**   Regional trends in heroin reported per 100,000 persons aged 15 or older, January 2001–June 2017

Figure 1.15   Regional trends in MDMA reported per 100,000 persons aged 15 or older, January 2001–June 2017[1]

Note: U.S. Census 2017 population data by age were not available for this publication. Population data for 2017 were imputed.
[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

Section 2: Major Drug Categories

This section presents results for major drug categories. Specifically, this section presents estimates of specific drugs by drug category using the NEAR approach. All drugs mentioned in laboratories' drug items are included in the counts. Drug categories presented in this section include narcotic analgesics, tranquilizers and depressants, anabolic steroids, phenethylamines, and synthetic cannabinoids. A total of 776,836 drug reports were submitted to State and local laboratories from January 1, 2017, through June 30, 2017, and analyzed by September 30, 2017.

Table 2.1	NARCOTIC ANALGESICS Number and percentage of narcotic analgesic reports in the United States, January 2017–June 2017[1]	
Narcotic Analgesic Reports	**Number**	**Percent**
Fentanyl	25,460	30.49%
Oxycodone	16,405	19.65%
Hydrocodone	10,802	12.94%
Buprenorphine	9,180	10.99%
Furanyl fentanyl	3,322	3.98%
Tramadol	3,055	3.66%
Morphine	2,524	3.02%
Carfentanil	2,268	2.72%
Codeine	1,596	1.91%
Hydromorphone	1,583	1.90%
Methadone	1,543	1.85%
Acryl fentanyl	1,508	1.81%
U-47700	1,087	1.30%
Oxymorphone	890	1.07%
3-Methylfentanyl	432	0.52%
Other narcotic analgesics	1,844	2.21%
Total Narcotic Analgesic Reports[2]	83,501	100.00%
Total Drug Reports	776,836	

U–47700=3,4–Dichloro–N–[2–(dimethylamino)cyclohexyl]–N–methylbenzamide

[1] Includes drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, that were analyzed by September 30, 2017.

[2] Numbers and percentages may not sum to totals because of rounding.

Figure 2.1 Distribution of narcotic analgesic reports within region, January 2017–June 2017[1]
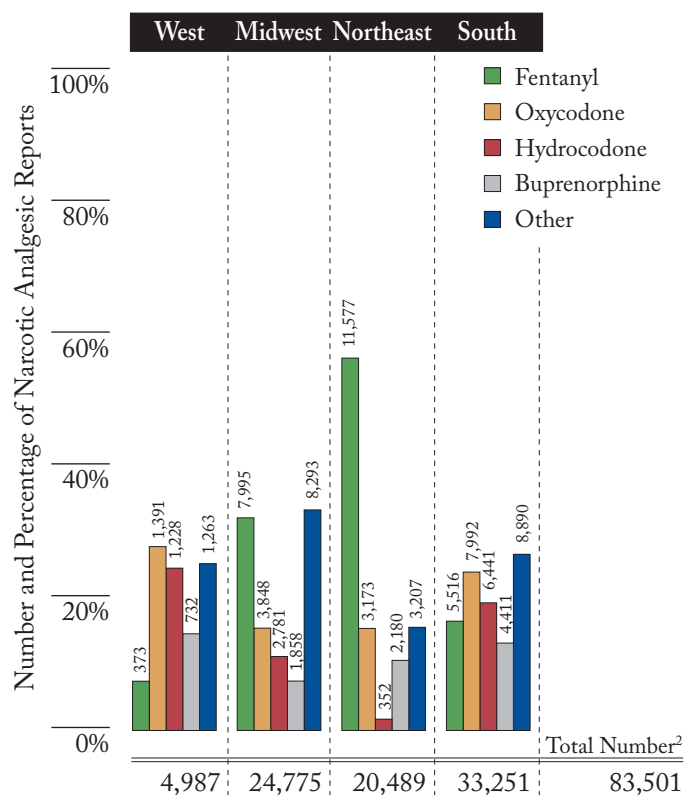
Table 2.2	TRANQUILIZERS AND DEPRESSANTS
	Number and percentage of tranquilizer and depressant reports in the United States, January 2017–June 2017[1]

Tranquilizer and Depressant Reports	Number	Percent
Alprazolam	23,877	60.48%
Clonazepam	5,477	13.87%
Phencyclidine (PCP)	2,404	6.09%
Diazepam	2,119	5.37%
Lorazepam	1,140	2.89%
Carisoprodol	903	2.29%
Ketamine	731	1.85%
Zolpidem	689	1.75%
Cyclobenzaprine	442	1.12%
Etizolam	322	0.81%
Hydroxyzine	211	0.53%
Pregabalin	211	0.53%
Temazepam	114	0.29%
Gamma-hydroxybutyrate (GHB)	111	0.28%
Butalbital	100	0.25%
Other tranquilizers and depressants	631	1.60%
Total Tranquilizer and Depressant Reports[2]	39,480	100.00%
Total Drug Reports	776,836	

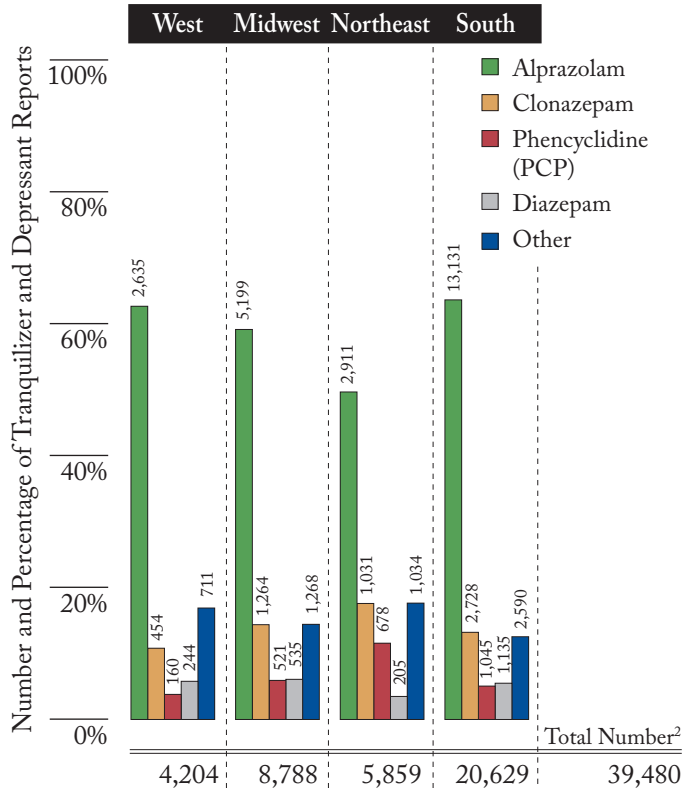Figure 2.2 Distribution of tranquilizer and depressant reports within region, January 2017–June 2017[1]

Table 2.3	ANABOLIC STEROIDS
	Number and percentage of anabolic steroid reports in the United States, January 2017–June 2017[1]

Anabolic Steroid Reports	Number	Percent
Testosterone	724	40.07%
Oxymetholone	281	15.52%
Trenbolone	180	9.99%
Methandrostenolone	125	6.92%
Stanozolol	102	5.64%
Nandrolone	82	4.55%
Boldenone	65	3.57%
Oxandrolone	59	3.28%
Drostanolone	42	2.33%
Mestanolone	14	0.76%
Mesterolone	11	0.59%
Other anabolic steroids	123	6.80%
Total Anabolic Steroid Reports[2]	1,807	100.00%
Total Drug Reports	776,836	

Figure 2.3 Distribution of anabolic steroid reports within region, January 2017–June 2017[1]
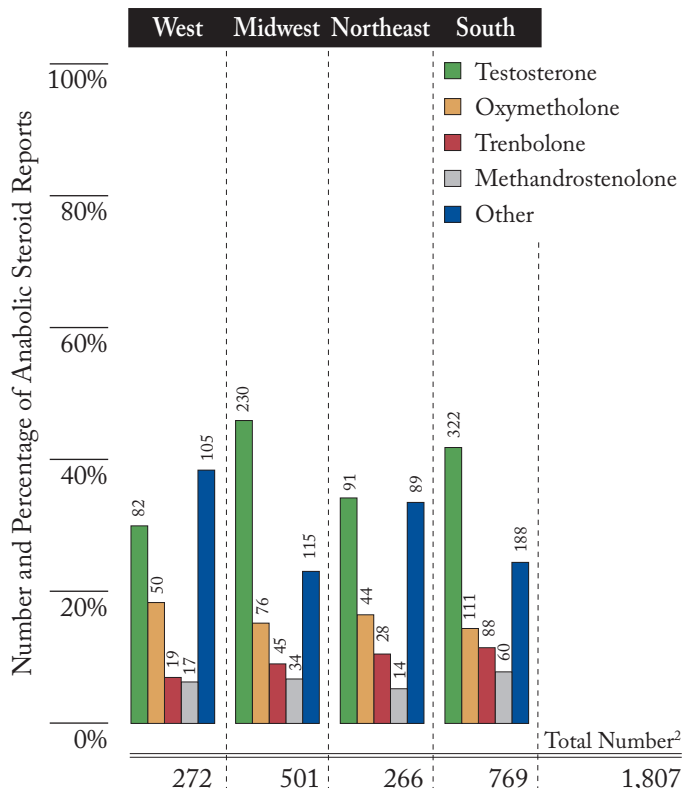
[1] Includes drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, that were analyzed by September 30, 2017.

[2] Numbers and percentages may not sum to totals because of rounding.

Table 2.4	**PHENETHYLAMINES** *Number and percentage of phenethylamine reports in the United States, January 2017–June 2017[1]*

Phenethylamine Reports	Number	Percent
Methamphetamine	170,300	91.43%
Amphetamine	6,158	3.31%
MDMA	2,695	1.45%
N-Ethylpentylone	2,520	1.35%
Lisdexamfetamine	792	0.43%
Dibutylone	655	0.35%
MDA	611	0.33%
alpha-PVP	512	0.27%
Phentermine	268	0.14%
Ethylone	169	0.09%
Benzphetamine	162	0.09%
Pentylone	133	0.07%
N-Ethylhexedrone	72	0.04%
25I-NBOMe	57	0.03%
4-CEC	53	0.03%
Other phenethylamines	1,095	0.59%
Total Phenethylamine Reports[2]	186,253	100.00%
Total Drug Reports	776,836	

MDMA=3,4–Methylenedioxymethamphetamine
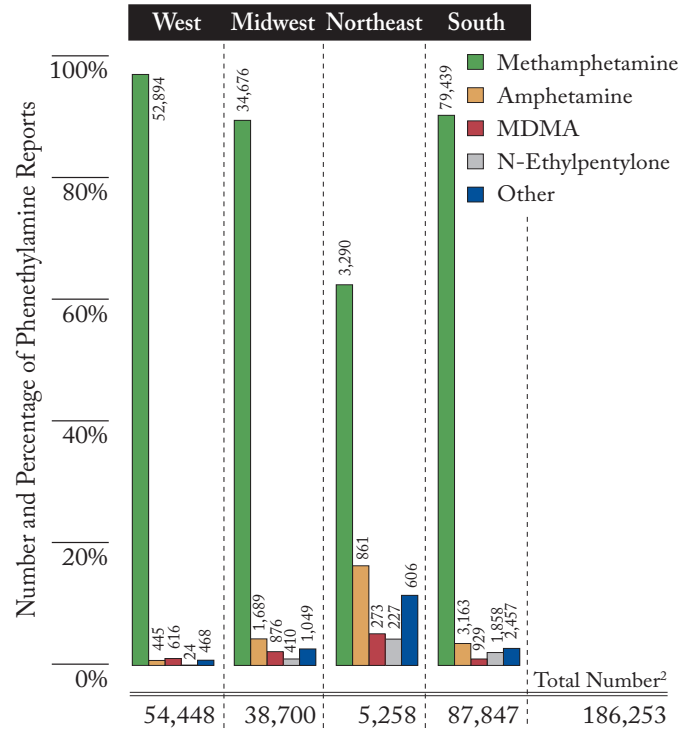MDA=3,4–Methylenedioxyamphetamine
alpha–PVP=alpha–Pyrrolidinopentiophenone
4–CEC=4–Chloro–N–ethylcathinone
25I–NBOMe=2–(4–Iodo–2,5–dimethoxyphenyl)–N–(2–methoxybenzyl)ethanamine

Figure 2.4 Number and percentage of phenethylamine reports in the United States, January 2017–June 2017[1]

	West	Midwest	Northeast	South	Total Number[2]
Total Number	54,448	38,700	5,258	87,847	186,253

Legend: Methamphetamine, Amphetamine, MDMA, N-Ethylpentylone, Other

West: Methamphetamine 52,894; Amphetamine 445; MDMA 616; N-Ethylpentylone 24; Other 468
Midwest: Methamphetamine 34,676; Amphetamine 1,689; MDMA 876; N-Ethylpentylone 410; Other 1,049
Northeast: Methamphetamine 3,290; Amphetamine 861; MDMA 273; N-Ethylpentylone 227; Other 606
South: Methamphetamine 79,439; Amphetamine 3,163; MDMA 929; N-Ethylpentylone 1,858; Other 2,457

[1] Includes drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, that were analyzed by September 30, 2017.
[2] Numbers and percentages may not sum to totals because of rounding.

Tray of ice (methamphetamine)

<table>
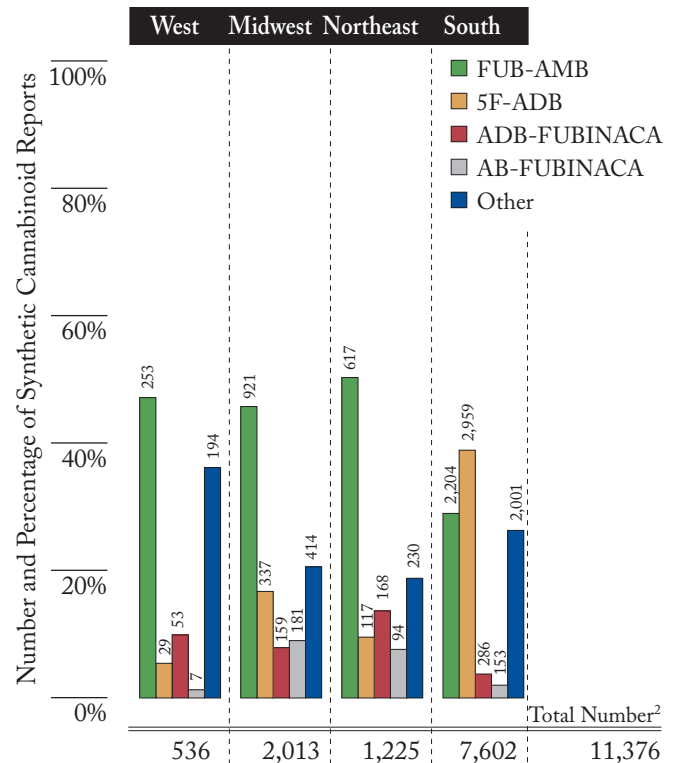<tr><td>Table 2.5</td><td>SYNTHETIC CANNABINOIDS
Number and percentage of synthetic cannabinoid reports in the United States, January 2017–June 2017[1]</td></tr>
</table>

Synthetic Cannabinoid Reports	Number	Percent
FUB-AMB	3,995	35.11%
5F-ADB	3,442	30.25%
ADB-FUBINACA	666	5.85%
AB-FUBINACA	435	3.82%
XLR11	187	1.64%
AB-CHMINACA	173	1.52%
MAB-CHMINACA	164	1.44%
5F-AMB	138	1.22%
NM2201	79	0.69%
AKB48 N-(4-fluorobenzyl)	64	0.56%
MMB-CHMICA	53	0.46%
JWH-018 (AM-678)	48	0.42%
AB-PINACA	41	0.36%
MDMB-CHMICA	37	0.33%
Other synthetic cannabinoids	1,856	16.32%
Total Synthetic Cannabinoid Reports[2]	11,376	100.00%
Total Drug Reports	776,836	

FUB–AMB=Methyl 2–({1–[(4–fluorophenyl)methyl]–1H–indazole–3–carbonyl} amino)–3–methylbutanoate

5F–ADB=Methyl (R)–2–(1–(5–fluoropentyl)–1H–indazole–3–carboxamido)–3,3–dimethylbutanoate

ADB–FUBINACA=N–(1–Amino–3,3–dimethyl–1–oxobutan–2–yl)–1–(4–fluorobenzyl)–1H–indazole–3–carboxamide

AB–FUBINACA=(N–(1–Amino–3–methyl–1–oxobutan–2–yl)–1–(4–fluorobenzyl)–1H–indazole–3–carboxamide)

XLR11=[1–(5–Fluoro–pentyl)1H–indol–3–yl],(2,2,3,3–tetramethylcyclopropyl) methanone

AB–CHMINACA=(N–(1–Amino–3–methyl–1oxobutan–2–yl)–1–(cyclohexylmethyl)1H–indazole–3–carboxamide

MAB–CHMINACA=N–(1–Amino–3,3–dimethyl–1–oxobutan–2–yl)–1–(cyclohexylmethyl)–1H–indazole–3–carboxamide

5F–AMB=methylN–{[1–(5–fluoropentyl)–1H–indazol–3–yl]carbonyl} valinate

NM2201=Naphthalene–1–yl 1–(5–fluoropentyl)–1H–indole–3–carboxylate

AKB48 N–(4–fluorobenzyl)=N–(1–Adamantyl)–1–(4–fluorobenzyl)–1H–indazole–3–carboxamide

MMB–CHMICA=Methyl N–(1–(cyclohexylmethyl)–1H–indole–3–carbonyl) valinate

JWH–018 (AM–678)=1–pentyl–3–(1–naphthoyl)indole

AB–PINACA=(N–(1–Amino–3–methyl1–oxobutan–2–yl)–1–pentyl–1H–indazole3–carboxamide)

MDMB–CHMICA=Methyl (S)–2–(1–(cyclohexylmethyl)–1H–indole–3–carboxamido)–3,3–dimethylbutanoate

Figure 2.5 Distribution of synthetic cannabinoid reports within region, January 2017–June 2017[1]

Synthetic cannabinoids

[1] *Includes drug reports submitted to laboratories from January 1, 2017, through June 30, 2017, that were analyzed by September 30, 2017.*

[2] *Numbers and percentages may not sum to totals because of rounding.*

Overview

Since 2001, NFLIS-Drug publications have included national and regional estimates for the number of drug reports and drug cases analyzed by State and local forensic laboratories in the United States. This appendix discusses the methods used for producing these estimates, including sample selection, weighting, imputation, and trend analysis procedures. RTI International, under contract to the DEA, began implementing NFLIS-Drug in 1997. Results from a 1998 survey (updated in 2002, 2004, 2008, and 2013) provided laboratory-specific information, including annual caseloads, which was used to establish a national sampling frame of all known State and local forensic laboratories that routinely perform drug chemistry analyses. A probability proportional to size (PPS) sample was drawn on the basis of annual cases analyzed per laboratory, resulting in a NFLIS-Drug national sample of 29 State laboratory systems and 31 local or municipal laboratories, and a total of 168 individual laboratories (see Appendix B for a list of sampled NFLIS-Drug laboratories).

Estimates appearing in this publication are based on cases and items *submitted* to laboratories between January 1, 2017, and June 30, 2017, and analyzed by September 30, 2017. Analysis has shown that approximately 95% of cases submitted during an annual period are analyzed within three months of the end of the annual period (not including the approximately 30% of cases that are never analyzed).

Since 2011, the estimation procedures have accounted for multiple drugs per item. For each drug item (or exhibit) analyzed by a laboratory in the NFLIS-Drug program, up to three drugs were reported to NFLIS and counted in the estimation process. A further enhancement to account for multiple drugs per item was introduced in 2017 for the 2016 Annual Report. All drugs reported in an item are now counted in the estimation process. This change ensures that the estimates will take into consideration all reported substances, including emerging drugs of interest that may typically be reported as the fourth or fifth drug within an item. This change was implemented in the 2016 data processing cycle and for future years. Although this change could not be applied to reporting periods before 2016, the 2016 data showed that 99.97% of drug reports are captured in the first, second, or third drug report for any item; therefore, no statistical adjustments were deemed necessary to maintain the trend with prior years.

Currently, laboratories representing more than 98% of the national drug caseload participate in NFLIS-Drug, with about 96% of the national caseload reported for the current reporting period. Because of the continued high level of reporting among laboratories, the NEAR (National Estimates Based on All Reports) method, which has strong statistical advantages for producing national and regional estimates, continues to be implemented.

NEAR Methodology

In NFLIS-Drug publications before 2011, data reported by nonsampled laboratories were not used in national or regional estimates.[i] However, as the number of nonsampled laboratories reporting to NFLIS-Drug increased,[ii] it began to make sense to consider ways to use the data they submitted. Under NEAR, the "volunteer" laboratories (i.e., the reporting nonsampled laboratories) represent themselves and are no longer represented by the reporting sampled laboratories. The volunteer laboratories are assigned weights of one; hence, the weights of the sampled and responding laboratories are appropriately adjusted downward. The outcome is that the estimates are more precise, especially for recent years, which include a large number of volunteer laboratories. More precision allows for more power to detect trends and fewer suppressed estimates in Tables 1.1 and 1.2 of the NFLIS-Drug Annual and Midyear Reports.

NEAR imputations and adjusting for missing monthly data in reporting laboratories

Because of technical and other reporting issues, some laboratories do not report data for every month during a given reporting period, resulting in missing monthly data. If a laboratory reports fewer than six months of data for the annual estimates (fewer than three months for the semiannual estimates), it is considered nonreporting, and its reported data are not included in the estimates. Otherwise, imputations are performed separately by drug for laboratories that are missing monthly data, using drug-specific proportions generated from laboratories that are reporting all months of data. This imputation method is used for cases, items, and drug-specific reports and accounts for the typical month-to-month variation and the size of the laboratory requiring imputation. The general idea is to use the nonmissing months to assess the size of the laboratory requiring imputation and then to apply the seasonal pattern exhibited by all laboratories with no missing data. Imputations of monthly case counts are created using the following ratio (r_L):

$$r_L = \frac{\sum_{m \in R_L} c_{L,m}}{\sum_{m \in R_L} c_{.,m}},$$

where

R_L = set of all nonmissing months in laboratory L,

$c_{L,m}$ = case count for laboratory L in month m, and

$c_{.,m}$ = mean case counts for all laboratories reporting complete data.

---

[i] The case and item loads for the nonsampled laboratories were used in calculating the weights.

[ii] In the current reporting period, for example, out of 108 nonsampled laboratories and laboratory systems, 82 (or 76%) reported.

Monthly item counts are imputed for each laboratory using an estimated item-to-case ratio (s_L) for nonmissing monthly item counts within the laboratory. The imputed value for the missing monthly number of items in each laboratory is calculated by multiplying $c_{L,m}$ by s_L.

$$ s_L = \frac{\sum_{m \in R_L} i_{L,m}}{\sum_{m \in R_L} c_{L,m}}, $$

where

R_L = set of all nonmissing months in laboratory L,
$i_{L,m}$ = item count for laboratory L in month m, and
$c_{L,m}$ = case count for laboratory L in month m.

Drug-specific case and report counts are imputed using the same imputation techniques presented above for the case and item counts. The total drug, item, and case counts are calculated by aggregating the laboratory and laboratory system counts for those with complete reporting and those that require imputation.

NEAR imputations and drug report-level adjustments

Most forensic laboratories classify and report case-level analyses consistently in terms of the number of vials of a particular pill. A small number, however, do not produce drug report-level counts in the same way as those submitted by the vast majority. Instead, they report as items the count of the individual pills themselves. Laboratories that consider items in this manner also consider drug report-level counts in this same manner. Drug report-to-case ratios for each drug are produced for the similarly sized laboratories, and these drug-specific ratios are then used to adjust the drug report counts for the relevant laboratories.

NEAR weighting procedures

Each NFLIS-Drug reporting laboratory is assigned a weight to be used in calculating design-consistent, nonresponse-adjusted estimates. Two weights are created: one for estimating cases and one for estimating drug reports. The weight used for case estimation is based on the caseload for every laboratory in the NFLIS-Drug population, and the weight used for drug reports' estimation is based on the item load for every laboratory in the NFLIS-Drug population. For reporting laboratories, the caseload and item load used in weighting are the reported totals. For nonreporting laboratories, the caseload and item load used in weighting are based on completion-based data obtained from an updated laboratory survey administered in 2013, or, in some cases, via direct communication with laboratories or other external sources.

When the NFLIS-Drug sample was originally drawn, state systems (and the multilaboratory local systems known to

exist) were treated as a single laboratory; so, if a State system was selected, all laboratories in the system were selected. The sampling frame of laboratories was divided into four strata by two stratifiers: (1) type of laboratory (State system or municipal or county laboratory) and (2) determination of "certainty" laboratory status. The criteria used in selecting the certainty laboratories included (1) size, (2) region, (3) geographical location, and (4) other special considerations (e.g., strategic importance of the laboratory). To ensure that the NFLIS-Drug sample had strong regional representation, U.S. census regions were used as the geographical divisions to guide the selection of certainty laboratories and systems. Some large laboratories were automatically part of the original NFLIS-Drug sample because they were deemed critically important to the calculation of reliable estimates.

Each weight has two components, the design weight and the nonresponse adjustment factor, the product of which is the final weight used in estimation. After imputation, the final item weight is based on the item count, and the final case weight is based on the case count of each laboratory or laboratory system. The final weights are used to calculate national and regional estimates. The first component, the design weight, is based on the proportion of the caseload and item load of the NFLIS-Drug universe[iii] represented by the individual laboratory or laboratory system. This step takes advantage of the original PPS sample design and provides precise estimates as long as the drug-specific case and report counts are correlated with the overall caseload and item load.[iv]

During the weighting process, laboratories are further categorized into 16 strata by region (Northeast, Midwest, South, and West), in addition to type of laboratory (State system or municipal or county laboratory) and certainty status, which were both used in defining the sampling strata. For noncertainty reporting laboratories in the sample (and reporting laboratories in the certainty strata with nonreporting laboratories), the design-based weight for each laboratory is calculated as follows:

Design Weight$_i$ = $A/(B \times$ Case [item] Count for Laboratory or Laboratory System i),

where
i = ith laboratory or laboratory system;
A = sum of the case (item) counts for all of the laboratories and laboratory systems (sampled and nonsampled) within a specific stratum, excluding certainty strata and the volunteer stratum; and
B = number of sampled laboratories and laboratory systems within the same stratum, excluding certainty strata and the volunteer stratum.

---

iii See the Introduction of this publication for a description of the NFLIS-Drug universe.

iv Lohr, S. L. (2010). *Sampling: Design and analysis* (2nd ed., pp. 231-234). Boston, MA: Brooks/Cole.

Certainty laboratories are assigned a design weight of one.[v]

The second component, the nonresponse adjustment factor, adjusts the weights of the reporting and sampled laboratories to account for the nonreporting and sampled laboratories. The nonresponse (*NR*) adjustment, for certainty and noncertainty laboratories, is calculated as follows:

$$NR_j = C/D,$$

where

j = stratum;

C = number of sampled laboratories and laboratory systems in the stratum, excluding the volunteer stratum; and

D = number of laboratories and laboratory systems in the stratum that are sampled and reporting.

Because volunteer laboratories represent only themselves, they are automatically assigned a final weight of one.

NEAR estimation

The estimates in this publication are the weighted sum of the counts from each laboratory. The weighting procedures make the estimates more precise by assigning large weights to small laboratories and small weights to large laboratories.[vi] Because most of the values being estimated tend to be related to laboratory size, the product of the weight and the value to be estimated tend to be relatively stable across laboratories, resulting in precise estimates.

A finite population correction is also applied to account for the high sampling rate. In a sample-based design, the sampling fraction, which is used to create the weights, equals the number of sampled laboratories divided by the number of laboratories in the NFLIS-Drug universe. Under NEAR, the sampling fraction equals the number of sampled laboratories divided by the sum of the number of sampled laboratories and the number of nonreporting, nonsampled laboratories. Volunteer laboratories are not included in the sampling fraction calculation. Thus, the NEAR approach makes the sampling rate even higher because volunteer laboratories do not count as nonsampled laboratories.

Suppression of Unreliable Estimates

For some drugs, such as cannabis/THC and cocaine, thousands of reports occur annually, allowing for reliable national prevalence estimates to be computed. For other drugs, reliable and precise estimates cannot be computed because of a combination of low report counts and substantial variability in report counts between laboratories. Thus, a suppression rule was established. Precision and reliability of estimates are evaluated

using the relative standard error (RSE), which is the ratio between the standard error of an estimate and the estimate. Drug estimates with an RSE > 50% are suppressed and not shown in the tables.

Statistical Techniques for Trend Analysis

Two types of analyses to compare estimates across years are used. The first is called *prior-year comparisons* and compares national and regional estimates from January 2016 through June 2016 with those from January 2017 through June 2017. The second is called *long-term trends* and examines trends in the semiannual national and regional estimates from January 2001 through June 2017. The long-term trends method described below was implemented beginning with the 2012 Midyear Report. The new method offers the ability to identify linear and curved trends, unlike the method used in previous NFLIS-Drug publications. Both types of trend analyses are described below. For the region-level prior-year comparisons and long-term trends, the estimated drug reports are standardized to the most recent regional population totals for persons aged 15 years or older.

Prior-year comparisons

For selected drugs, the prior-year comparisons statistically compare estimates in Table 1.1 of this publication with estimates in Table 1.1 of the 2016 Midyear Report. The specific test examines whether the difference between any two estimates is significantly different from zero. A standard *t* test is completed using the statistic,

$$t_{df} = \frac{a\hat{T}_{2017} - b\hat{T}_{2016}}{\sqrt{a^2 \, \text{var}(\hat{T}_{2017}) + b^2 \, \text{var}(\hat{T}_{2016}) - 2ab \, \text{cov}(\hat{T}_{2016,}\hat{T}_{2017})}} \, ,$$

where

df = appropriate degrees of freedom (number of laboratories minus number of strata);

$\hat{T}_{2017}$ = estimated total number of reports for the given drug for January 2017 through June 2017;

$\hat{T}_{2016}$ = estimated total number of reports for the given drug for January 2016 through June 2016;

$\text{var}(\hat{T}_{2017})$ = variance of $\hat{T}_{2017}$;

$\text{var}(\hat{T}_{2016})$ = variance of $\hat{T}_{2016}$; and

$\text{cov}(\hat{T}_{2016},\hat{T}_{2017})$ = covariance between $\hat{T}_{2016}$ and $\hat{T}_{2017}$.

For the national prior-year comparisons, $a = b = 1$. For the regional prior-year comparisons, a = 100,000 divided by the regional population total for 2017, and b = 100,000 divided by the regional population total for 2016.

The percentile of the test statistic in the *t* distribution determines whether the prior-year comparison is statistically significant (a two-tailed test at α = .05).

---

[v] With respect to the design weight, reporting laboratories and laboratory systems in certainty strata with nonreporting laboratories and laboratory systems are treated the same way as reporting noncertainty sampled laboratories and laboratory systems. This is done to reduce the variance; otherwise, all reporting laboratories and laboratory systems in these strata would get the same weight regardless of their size.

[vi] See footnote iv.

Long-term trends

A long-term trend analysis is performed on the January 2001 through June 2017 semiannual national estimates of totals and regional estimates of rates for selected drug reports. The models allow for randomness in the totals and rates due to the sample and the population. That is, for the vector of time period totals over that time,

$$\mathbf{Y}^T \equiv (Y_1, Y_2, \ldots, Y_{33}),$$

and for the estimates,

$$\hat{\mathbf{Y}}^T \equiv (\hat{Y}_1, \hat{Y}_2, \ldots, \hat{Y}_{33}),$$

the regression model is

$$\hat{\mathbf{Y}} = \mathbf{X}\beta + \eta + \varepsilon,$$

where

$\eta = \hat{\mathbf{Y}} - \mathbf{Y}$ is a 33 × 1 vector of errors due to the probability sample, and

$\varepsilon = 33 \times 1$ vector of errors due to the underlying model.

Randomness due to the sample exists because only a sample of all eligible laboratories has been randomly selected to be included. Randomness due to the population exists because many factors that can be viewed as random contribute to the specific total reported by a laboratory in a time period. For example, not all drug seizures that could have been made were actually made, and there may have been some reporting errors. If rates (per 100,000 persons aged 15 years or older) and not totals are of interest, the above model can be applied to $\hat{\mathbf{Y}}^* = c\hat{\mathbf{Y}}$, where c equals 100,000 divided by the 15-or-older regional population size as given by the U.S. Census Bureau.

The regression model used to perform the analysis is

$$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \cdots + \alpha_m t^m + \varepsilon_t \qquad t = 1, \ldots, T,$$

where

Y_t = the population total value, considered to be a realization of the underlying model; and

ε_t = one of a set of 33 independent normal variates with a mean of zero and a variance of σ^2.

The model allows for a variety of trend types, depending on the maximal polynomial degree of the analysis, such as the following: linear (straight line; $m = 1$), quadratic (U-shaped; $m = 2$), cubic (S-shaped; $m = 3$), quartic (higher-order shape; $m = 4$), and quintic (higher-order shape; $m = 5$). Because it is a model for Y_t but the sample estimates $\hat{Y}_t$ differ by the sampling error, estimation was performed by restricted maximum likelihood (REML), allowing for the two sources of error.

To implement the regression model, point estimates of totals $\hat{Y}_t$ and their standard errors are obtained for all 33 semiannual periods beginning with the January to June 2001 period and ending with the January to June 2017 period. Sampling standard errors are estimated as the full sampling variance-covariance matrix $\mathbf{S}$ over these 33 periods. The $\mathbf{S}$ matrix contains variances in totals at any period and covariances in totals between any two periods, thus giving a very general modeling of the sampling variance structure. The variance-covariance matrix of the totals is then $V[\hat{\mathbf{Y}}] = \sigma^2 \mathbf{I} + \mathbf{S}$, where $\mathbf{I}$ is the identity matrix.

Before the 2016 Annual Report, the variance and covariance components of the $\mathbf{S}$ matrix for the means were estimated simultaneously. The variance-covariance matrix for the means was then converted into a variance-covariance matrix for the totals. A change was introduced in 2017 in which the covariances of the totals are directly estimated, and the estimation of the covariance of the means is no longer necessary. This change in the computation of the covariance of totals provides an incremental improvement over the old approach and theoretically provides more valid statistical inferences. In addition, it creates consistency in the covariance estimation between these long-term trends and the prior-year comparisons.

Regression coefficients are estimated using the REML method. Because higher-order polynomial regression models generally show strong collinearity among predictor variables, the model is reparameterized using orthogonal polynomials. The reparameterized model is

$$Y_t = \beta_0 X_0(t) + \beta_1 X_1(t) + \beta_2 X_2(t) + \cdots + \beta_m X_m(t) + \varepsilon_t \qquad t = 1, \ldots, T,$$

where

$X_0(t) = 1 / \sqrt{T}$ for all t, and

$X_1(t), \ldots, X_m(t)$ provide contributions for the first-order (linear), second-order (quadratic), and higher-order polynomials.

Note that the error term is the same in the original model and the reparameterized model because the fitted surface is the same for both models. The model is further constrained to have regression residuals sum to zero, a constraint that is not guaranteed by theory for these models but is considered to improve model fit because of an approximation required to estimate $\mathbf{S}$. Standard errors of the regression trend estimates are obtained by simulation.

Final models are selected after testing for the significance of coefficients at the α = 0.05 level ($p < .05$), which means that if the trend of interest (linear, quadratic, or other higher-order polynomial) was in fact zero, then there would be a 5% chance that the trend would be detected as statistically significant when in fact it is not. Final fitted models are most easily interpreted using graphical plots.

NFLIS-DRUG PARTICIPATING AND REPORTING FORENSIC LABORATORIES

State	Lab Type	Laboratory Name	Reporting
AK	State	Alaska Department of Public Safety	✓
AL	State	Alabama Department of Forensic Sciences (5 sites)	✓
AR	State	Arkansas State Crime Laboratory (2 sites)	✓
AZ	State	Arizona Department of Public Safety, Scientific Analysis Bureau (4 sites)	✓
	Local	Mesa Police Department	✓
	Local	Phoenix Police Department	✓
	Local	Scottsdale Police Department	✓
	Local	Tucson Police Department Crime Laboratory	✓
CA	State	California Department of Justice (10 sites)	✓
	Local	Alameda County Sheriff's Office Crime Laboratory (San Leandro)	✓
	Local	Contra Costa County Sheriff's Office (Martinez)	✓
	Local	Fresno County Sheriff's Forensic Laboratory	✓
	Local	Kern County District Attorney's Office (Bakersfield)	✓
	Local	Long Beach Police Department	✓
	Local	Los Angeles County Sheriff's Department (4 sites)	✓
	Local	Los Angeles Police Department (2 sites)	✓
	Local	Oakland Police Department Crime Laboratory	✓
	Local	Orange County Sheriff's Department (Santa Ana)	✓
	Local	Sacramento County District Attorney's Office	✓
	Local	San Bernardino County Sheriff's Department	✓
	Local	San Diego County Sheriff's Department	✓
	Local	San Diego Police Department	✓
	Local	San Francisco Police Department*	✓
	Local	San Mateo County Sheriff's Office (San Mateo)	✓
	Local	Santa Clara District Attorney's Office (San Jose)	✓
	Local	Solano County District Attorney Bureau of Forensic Services	
	Local	Ventura County Sheriff's Department	✓
CO	State	Colorado Bureau of Investigation (4 sites)	✓
	Local	Aurora Police Department	✓
	Local	Colorado Springs Police Department	
	Local	Denver Police Department Crime Laboratory	✓
	Local	Jefferson County Sheriff's Office (Golden)	
CT	State	Connecticut Department of Public Safety	✓
DE	State	Chief Medical Examiner's Office	✓
FL	State	Florida Department of Law Enforcement (5 sites)	✓
	Local	Broward County Sheriff's Office (Fort Lauderdale)	✓
	Local	Indian River Crime Laboratory (Fort Pierce)	✓
	Local	Manatee County Sheriff's Office (Bradenton)	✓
	Local	Miami-Dade Police Department Crime Laboratory	✓
	Local	Palm Beach County Sheriff's Office Crime Laboratory (West Palm Beach)	✓
	Local	Pinellas County Forensic Laboratory (Largo)	✓
	Local	Sarasota County Sheriff's Office	✓
GA	State	Georgia State Bureau of Investigation (6 sites)	✓
HI	Local	Honolulu Police Department	✓
IA	State	Iowa Division of Criminal Investigations	✓
ID	State	Idaho State Police (3 sites)	✓
IL	State	Illinois State Police (6 sites)	✓
	Local	DuPage County Forensic Science Center (Wheaton)	✓
	Local	Northern Illinois Police Crime Laboratory (Chicago)	✓
IN	State	Indiana State Police Laboratory (4 sites)	✓
	Local	Indianapolis-Marion County Forensic Laboratory (Indianapolis)	✓
KS	State	Kansas Bureau of Investigation (3 sites)	✓
	Local	Johnson County Sheriff's Office (Mission)	✓
	Local	Sedgwick County Regional Forensic Science Center (Wichita)	✓
KY	State	Kentucky State Police (6 sites)	✓
LA	State	Louisiana State Police	✓
	Local	Acadiana Criminalistics Laboratory (New Iberia)	✓
	Local	Jefferson Parish Sheriff's Office (Metairie)	✓
	Local	New Orleans Police Department Crime Laboratory	
	Local	North Louisiana Criminalistics Laboratory System (3 sites)	✓
	Local	Southwest Louisiana Criminalistics Laboratory (Lake Charles)	✓
MA	State	Massachusetts State Police	✓
	Local	University of Massachusetts Medical School (Worcester)	✓
MD	State	Maryland State Police Forensic Sciences Division (3 sites)	✓
	Local	Anne Arundel County Police Department (Millersville)	✓
	Local	Baltimore City Police Department	✓
	Local	Baltimore County Police Department (Towson)	✓
	Local	Montgomery County Police Department Crime Laboratory (Rockville)	✓
	Local	Prince George's County Police Department (Landover)	
ME	State	Maine Department of Health and Human Services	✓
MI	State	Michigan State Police (8 sites)	✓
MN	State	Minnesota Bureau of Criminal Apprehension (2 sites)	✓
MO	State	Missouri State Highway Patrol (9 sites)	✓
	Local	KCMO Regional Crime Laboratory (Kansas City)	✓
	Local	St. Charles County Police Department Criminalistics Laboratory (O'Fallon)	✓
	Local	St. Louis County Police Department Crime Laboratory (Clayton)	✓
	Local	St. Louis Police Department	✓

State	Lab Type	Laboratory Name	Reporting
MS	State	Mississippi Department of Public Safety (4 sites)	✓
	Local	Jackson Police Department Crime Laboratory	✓
	Local	Tupelo Police Department	✓
MT	State	Montana Forensic Science Division	✓
NC	State	North Carolina State Bureau of Investigation (3 sites)	✓
	Local	Charlotte-Mecklenburg Police Department	✓
	Local	Wilmington Police Department	
ND	State	North Dakota Crime Laboratory Division	✓
NE	State	Nebraska State Patrol Criminalistics Laboratory (2 sites)	✓
NH	State	New Hampshire State Police Forensic Laboratory	✓
NJ	State	New Jersey State Police (4 sites)	✓
	Local	Burlington County Forensic Laboratory (Mt. Holly)	✓
	Local	Cape May County Prosecutor's Office	✓
	Local	Hudson County Prosecutor's Office (Jersey City)	✓
	Local	Ocean County Sheriff's Department (Toms River)	✓
	Local	Union County Prosecutor's Office (Westfield)	✓
NM	State	New Mexico Department of Public Safety (3 sites)	✓
	Local	Albuquerque Police Department	✓
NV	Local	Henderson City Crime Laboratory	✓
	Local	Las Vegas Metropolitan Police Crime Laboratory	✓
	Local	Washoe County Sheriff's Office Crime Laboratory (Reno)	✓
NY	State	New York State Police (4 sites)	✓
	Local	Erie County Central Police Services Laboratory (Buffalo)	✓
	Local	Nassau County Office of Medical Examiner (East Meadow)	✓
	Local	New York City Police Department Crime Laboratory**	✓
	Local	Niagara County Sheriff's Office Forensic Laboratory (Lockport)	✓
	Local	Onondaga County Center for Forensic Sciences (Syracuse)	✓
	Local	Suffolk County Crime Laboratory (Hauppauge)	✓
	Local	Westchester County Forensic Sciences Laboratory (Valhalla)	✓
	Local	Yonkers Police Department Forensic Science Laboratory	✓
OH	State	Ohio Bureau of Criminal Identification & Investigation (4 sites)	✓
	State	Ohio State Highway Patrol	✓
	Local	Canton-Stark County Crime Laboratory (Canton)	✓
	Local	Columbus Police Department	✓
	Local	Cuyahoga County Regional Forensic Science Laboratory (Cleveland)	✓
	Local	Hamilton County Coroner's Office (Cincinnati)	✓
	Local	Lake County Regional Forensic Laboratory (Painesville)	✓
	Local	Lorain County Crime Laboratory (Elyria)	✓
	Local	Mansfield Police Department	✓
	Local	Miami Valley Regional Crime Laboratory (Dayton)	✓
	Local	Newark Police Department Forensic Services	✓
	Local	Toledo Police Forensic Laboratory	✓
OK	State	Oklahoma State Bureau of Investigation (5 sites)	✓
	Local	Tulsa Police Department Forensic Laboratory	✓
OR	State	Oregon State Police Forensic Services Division (5 sites)	✓
PA	State	Pennsylvania State Police Crime Laboratory (6 sites)	✓
	Local	Allegheny Office of the Medical Examiner Forensic Laboratory (Pittsburgh)	✓
	Local	Philadelphia Police Department Forensic Science Laboratory	✓
RI	State	Rhode Island Forensic Sciences Laboratory	✓
SC	State	South Carolina Law Enforcement Division	✓
	Local	Anderson/Oconee Regional Forensics Laboratory	✓
	Local	Charleston Police Department	
	Local	Richland County Sheriff's Department Forensic Sciences Laboratory (Columbia)	✓
	Local	Spartanburg Police Department	✓
SD	State	South Dakota Department of Public Health Laboratory	
	Local	Rapid City Police Department	✓
TN	State	Tennessee Bureau of Investigation (3 sites)	✓
TX	State	Texas Department of Public Safety (13 sites)	✓
	Local	Austin Police Department	✓
	Local	Bexar County Criminal Investigations Laboratory (San Antonio)	✓
	Local	Brazoria County Sheriff's Office Crime Laboratory (Angleton)	✓
	Local	Dallas Institute of Forensic Sciences	✓
	Local	Fort Worth Police Department Criminalistics Laboratory	
	Local	Harris County Institute of Forensic Sciences Crime Laboratory (Houston)	✓
	Local	Houston Forensic Science Local Governance Corporation	✓
	Local	Jefferson County Sheriff's Regional Crime Laboratory (Beaumont)	✓
UT	State	Utah Department of Public Safety (3 sites)	✓
VA	State	Virginia Department of Forensic Science (4 sites)	✓
VT	State	Vermont Forensic Laboratory	✓
WA	State	Washington State Patrol (6 sites)	✓
WI	State	Wisconsin Department of Justice (3 sites)	✓
	Local	Kenosha County Division of Health Services	✓
WV	State	West Virginia State Police	✓
WY	State	Wyoming State Crime Laboratory	✓
PR	Territory	Institute of Forensic Science of Puerto Rico Criminalistics Laboratory (3 sites)	

This list identifies laboratories that are participating in and reporting to NFLIS-Drug as of February 6, 2018.

*This laboratory is not currently conducting drug chemistry analysis. Cases for the agencies it serves are being analyzed via contracts or agreements with other laboratories.

**The New York City Police Department Crime Laboratory currently reports summary data.

Benefits

The systematic collection and analysis of drug analysis data aid our understanding of the Nation's illicit drug problem. NFLIS-Drug serves as a resource for supporting drug scheduling policy and drug enforcement initiatives nationally and in specific communities around the country.

Specifically, NFLIS-Drug helps the drug control community achieve its mission by

- providing detailed information on the prevalence and types of controlled substances secured in law enforcement operations;

- identifying variations in controlled and noncontrolled substances at the national, State, and local levels;

- identifying emerging drug problems and changes in drug availability in a timely fashion;

- monitoring the diversion of legitimately marketed drugs into illicit channels;

- providing information on the characteristics of drugs, including quantity, purity, and drug combinations; and

- supplementing information from other drug sources, including the National Survey on Drug Use and Health (NSDUH) and the Monitoring the Future (MTF) study.

NFLIS-Drug is an opportunity for State and local laboratories to participate in a useful, high-visibility initiative. Participating laboratories regularly receive reports that summarize national and regional data. In addition, the Data Query System (DQS) is a secure website that allows NFLIS-Drug participants—including State and local laboratories, the DEA, and other Federal drug control agencies—to run customized queries on the NFLIS-Drug data. Enhancements to the DQS provide a new interagency exchange forum that will allow the DEA, forensic laboratories, and other members of the drug control community to post and respond to current information.

Limitations

NFLIS-Drug has limitations that must be considered when interpreting findings generated from the database.

- Currently, NFLIS-Drug includes data from Federal, State, and local forensic laboratories. Federal data are shown separately in this publication. Efforts are under way to enroll additional Federal laboratories.

- NFLIS-Drug includes drug chemistry results from completed analyses only. Drug evidence secured by law enforcement but not analyzed by laboratories is not included in the database.

- National and regional estimates may be subject to variation associated with sample estimates, including nonresponse bias.

- State and local policies related to the enforcement and prosecution of specific drugs may affect drug evidence submissions to laboratories for analysis.

- Laboratory policies and procedures for handling drug evidence vary. Some laboratories analyze all evidence submitted to them, whereas others analyze only selected case items. Many laboratories do not analyze drug evidence if the criminal case was dismissed from court or if no defendant could be linked to the case.

- Laboratories vary with respect to the records they maintain. For example, some laboratories' automated records include the weight of the sample selected for analysis (e.g., the weight of one of five bags of powder), whereas others record total weight.

OBTAINING COPIES OF THIS PUBLICATION

Electronic copies of this publication can be downloaded from the NFLIS website at **https://www.nflis.deadiversion.usdoj.gov**.